
United States 1144
Circuit Court of Appeals
For the Ninth Circuit

Transcript of Record

GEORGE J. HENRY, Jr.,
Complainant.

vs.

CITY OF LOS ANGELES,
Defendant.

VOLUME 3
(Pages 801 to 1200 Inclusive)

Upon Appeal from the United States District Court for
the Southern District of California,
Southern Division

FILED
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F. D. MONCKTON,
CLERK.

A. The air-chamber on that penstock had one primary condition, regardless of what brought that condition about, and that was to protect the penstock from the dangers of excessive water-ram, no matter how it was caused nor by what it was caused nor when it was caused.

Q. 540. Just as is pointed out in the circular being "Defendant's Exhibit Cobb Pressure-regulating Device Circular"? Is that correct?

A. It was to protect the pipe against excessive suddenness or dangerous suddenness of blows due to ram caused by any cause whatever likely to occur.

Q. 541. Now, every time that this air-chamber or the air cushion in it was effective, there was a back-surge of the air after its first further compression?

A. There would have been.

Q. 542. If it was operative at all it was?

A. Yes, sir.

Q. 543. That exerted a back-kick or back-lash or back-thrust upon the water in the penstock?

A. It would.

Q. 544. And would not that effect somewhat the ultimate action of the governor with respect to the by-pass in the gate?

A. It would have if there had been no by-pass. But when the by-pass and the gate worked uniformly, as it did there, it had no effect whatever.

Q. 545. Well, the by-pass and gate did not alone handle the ram in the pipe, did they?

A. There was no ram in the pipe due to that alone. It never caused any ram in the pipe.

Q. 546. I say if there were a ram in the pipe they

did not take care of it alone in as much as the air-chamber was there to also take care of the ram? Isn't that correct?

A. The air-chamber was there, as I have stated several times, to protect the pipe-line or penstock, as we have sometimes called it, from damage due to stresses brought into it by sudden water-ram.

Mr. Blakeslee: Now, I will ask that the answer be stricken out as not responsive to the question. I will ask the question to be re-read, and I ask the witness to carefully consider it, and then answer it.

Mr. Westall: Counsel for the Defendant at this time wishes to note an objection to the constant repetition of questions which have already been thoroughly, completely and fully answered by the witness, the only object of the Complainant being to fill up the record with a large amount of irrelevant matter which has already been fully covered.

Mr. Blakeslee: We will leave the consideration of this objection, jointly with the record, to the court. The record speaks for itself.

(Question No. 546 read by the Examiner.)

A. If there had been any ram in the pipe caused by any forces outside of the water-wheel installation itself, the water-wheel gates and by-pass would not have been quickly effective in taking care of it. It would have required a change in the location of the governor parts due to the change of pressure in the pipe-line acting on the water-wheels, before the air-chamber had had time to regulate it.

Q. 547. By Mr. Blakeslee: In other words, the air-

chamber was necessary to completely take care of any such inertia effects as were present in the pipe-line?

A. No, sir; the governor mechanism would take care of it just as quick as the governor could feel the effect of the increased pressure trying to produce increased speed, as I have just immediately stated.

Q. 548. Well, every time that there was a change of pressure in the pipe-line, positively or negatively, that is, either one, the air column in the air receiver on the pipe-line was affected in volume, was it not?

A. Yes, sir.

Q. 549. And as there was nothing present there to maintain the air column at the altered volume there was a resultant action of that air upon the water in the penstock, causing a variation of pressure in the penstock, was there not?

A. There could be. That would be the action if there was a perceptible change in pressure. It would make a perceptible change in the water.

Q. 550. And that change of pressure would make a change in the resultant velocity of the water delivered at the gate controlled by the governor at this plant?

A. It would increase the pressure of the water in the nozzle if the pressure in the pipe-line was increased. That would endeavor to increase the speed and the governor action would immediately correct it.

Q. 551. In other words, the governor would have to take care of the changes in velocity of water delivered at the wheel-gates resultant upon changes in pressure in the pipe-line due to the action of the air column in the receiver, as well as to take care of other changes in the

velocity of the water delivered at the wheel-gate? Is that not correct?

A. The governor had to take care of everything that affected the pre-determined speed of the wheel. Whether that effect was produced by change of load or change of water pressures made no difference, and it did take care of it under those conditions.

Mr. Blakeslee: I will ask that the question be re-read, and I will ask the witness to please consider it carefully, taking such time as he wishes and then to answer in terms.

Mr. Westall: It is objected to that the question is not specific and definite and understandable, and it is submitted that the witness has given as complete and intelligible an answer as could be possible with such a question.

(Question No. 551 is read by the Examiner.)

A. The governor took care of changes in velocity of water, regardless of the cause of that change.

Mr. Blakeslee: I will have to ask that that answer be stricken out as not responsive, and ask that the answer be given yes or no to this question. The record shows that the witness has been fully informed by previous questions as to all of the factors entering into this question, and if the question is not understood I shall be pleased to re-state it. If it is understood I ask for a yes or no answer.

Mr. Westall: The question so worded is not perceptible of being properly answered in the manner pointed out by counsel without being open to a possible misconstruction by the court. It is a question that requires some explanation to accompany it.

Mr. Blakeslee: If counsel does not understand the question he is entitled to such position in the matter. We will leave its intelligibility and clearness to the court, and again repeat the question.

(Question No. 551 re-read by the Examiner.)

A. Yes.

Q. 552. By Mr. Blakeslee: Then until the suitable or normal balance was restored of the pressure in the air-chamber there would be a fluctuating velocity caused by the action of the air upon the water in the penstock which would have to be taken care of by the governor before final governing occurred? Is that not correct?

A. No, sir; it is not. Because the final governing never occurs in such an installation. The governor is there to work at all times, and did work at all times, and will work at all times to maintain the wheel at normal speed for a given load, regardless of the pressures at the water-wheel gate.

Q. 553. Then until the normal speed of the wheel was restored, that is, before the normal speed of the wheel is restored by governing actions, these fluctuations due to the action of the air-cushion or column in the air chamber had to be taken care of by the governor, did they not?

A. The governor was there to take care of all changes of pressure, all changes of speed and all changes of load at all times and always did it.

Q. 554. And it had to take care of these changes in pressure and fluctuations of velocity so caused by the air-cushion in the air-chamber, did it not?

A. Just the same as all other changes. It did that and all other changes just the same.

Q. 555. Then until such speed regulation had been effected by the governor there would be a governor-hunting action or oscillation, would there not?

A. The governor would certainly change its position for the changed conditions. Every time the condition changed the governor changed and maintained the wheel at uniform speed.

Q. 556. In other words, when the air first compressed in the air-chamber the governor was moved in one direction, and when on the rebound the air expanded in the chamber, the governor would move in the opposite direction? Is that not correct?

A. Certainly that is correct, and that condition might happen once in five years' time.

Q. 557. Well, will it happen whenever the air-chamber acted for the purposes for which it was installed, as you have testified?

A. Certainly. To avoid the chance of accident.

Q. 558. Or whenever there was a variation of pressure in the penstock?

A. That is right. That is absolutely right. And in this particular case under consideration at the Bakersfield plant no such changed pressure ever occurred during my presence at the plant.

Q. 559. And that was true when there was a change of velocity of water in the penstock?

A. We had no changes of velocity of water in the penstock when the plant was working at full load or par-

tial load or anything like that, because we had no other parties using water from the same penstock at all.

Q. 560. In that case why did you testify yesterday that under all conditions and all forms of governors you would uniformly and invariably specify the installation of such an air-chamber as that at this Power Development Company plant?

A. Because I stated several times before I would introduce it to produce elasticity in the system against any chance whatever of excessive pressures, however caused, within the system.

Q. 561. And that is, of course, acknowledging that such pressures are liable to occur in any such system?

A. It is recognizing the fact that such conditions have occurred, and trying to provide safety against damaging effects.

Q. 562. When the first air-chamber was in use in the North Star plant there was a governor present in that plant, was there not?

A. As I remember, there was.

Q. 563. Namely, the governor you have testified about?

A. It stood on the floor near the door. I cannot remember the details of it, but there was something there to govern the speed of the wheel, I think. I should recognize a photograph of it and I could say with regard to the photograph whether it was a photograph of that governor or not. But that seems about as far as my memory goes at this time. I can tell you what kind of spring there was on the fly-balls; I remember that much. It was a horizontal spiral spring instead of the

kind shown in these blueprints. I remember that perfectly well, but I do not remember the other part of it.

Q. 564. What comparison in cubical contents could you make as between the first air-chamber on that North Star plant and the air-chamber on the Power Development Company plant?

A. I determined the size of the one on the Bakersfield plant myself, and I did not determine the one on the North Star. But as I remember that one on the North Star, I should say it was about 20 inches in diameter, and that might be 4 inches out of the way but I don't think it is. I think it was about 20 inches in diameter. It might have been 16 or 18 feet high. I guess that is pretty near it. I don't know. I do not remember now measuring it. I did measure it once, but I did not measure the air-chamber.

Q. 565. What I want to know is, was that air chamber larger or smaller than the air-chamber of the Power Development Company plant?

A. It ^{was} ~~is~~ a smaller air-chamber than the Power Development Company plant and controlled a far smaller volume of water.

Q. 566. That is, the diameter and length of the penstock pipe was smaller at the North Star plant than at the Power Development Company plant?

A. Yes, sir; and the quantity of water used at the North Star plant was far less than that used at the Bakersfield plant.

Q. 567. Can you state approximately the diameter and length of the penstock pipe at the North Star plant?

A. I never went over the whole length of it. I under-

stood it was made up of different diameters as it proceeded up the mountains. As I remember, it was about 7 miles long, and down within the neighborhood of the power plant it was 16 inches in diameter for a mile or two, to my own knowledge, and in the course of its length at various points from the North Star plant to up near the intake, many other power plants took outlets from it, and what changes were made in the diameter of the pipe at such places I don't know anything about. I had nothing to do with the pipe-line or air-chambers on that system and consequently they are not in my mind excepting in so far as I remember that the pipe that was laid there was 16 inches, and that it was more than 16 inches for more than a mile, because I walked over it once to inspect it.

Q. 568. And the pipe-line you say was 7 miles long?

A. That is what I was told. That up to the very upper end where the water came from was 7 miles. But that is all hearsay with me.

Q. 569. Can you give me the dimensions with respect to the pipe-line of the Power Development Company plant?

A. I think I remember exactly the diameter of that. It was 44 inches.

Q. 570. And the length was about what?

A. I should think it might have been 1200 feet long. I guess it was about 1200 feet.

Q. 571. Give the outside figure.

A. Approximately a quarter of a mile long.

Q. 572. And the air-chamber at the Power Develop-

ment Company was of a greater capacity than at the North Star plant?

A. It was larger, and the quantity of water handled was very much greater.

Q. 573. You have testified that the velocity of the water at the Power Development Company plant was about 5 feet per second. What would you say as to the velocity at the North Star plant?

A. The velocity in the penstock at Bakersfield never reached 5 feet per second while we were there, but it was designed for 5 feet per second when all three units were put in.

Q. 574. How much was it?

A. We just guessed that it was one-third of that, because there was one-third of the water being used at one time. But at the North Star plant—on the 1896 installation—it was far less than 2 feet, for the same reason that their penstock was made to carry more water than they were at the time using. And afterwards, in 1898, further installations were put on the pipe, and I think they still considered that there was some capacity left to a small extent.

Q. 575. Now, in both of these plants, if I have understood you correctly, both the governor and the air-chamber were effective or intended to be effective with respect to taking care of changes of water pressure or velocity in the pipe-line leading to the plant. Is that correct, generally speaking?

A. It is too generally speaking for me to answer it properly, but I think I can make the condition clear by saying that the governors did not control the speed of

the water in the pipe-lines at all. The governors acted to control the speed of wheels due to such speed of water in the pipe-lines as was presented to them.

Q. 576. Such speed of water being, of course, in relation to the pressure of water in the pipe-line?

A. Speed and pressure are not necessarily dependent upon one another.

Q. 577. But in such a closed line the speed would be responsive to pressure, would it not?

A. No, sir; never at all. You might have an intense pressure and no speed, easy enough.

Q. 578. What I mean by "speed" is velocity of water.

A. So do I. You can have a pipe-line with a tremendous pressure in it with no velocity, unless you have some outlet.

Q. 579. I am talking of velocity at the gate.

A. Oh. The velocity of discharge at a gate outlet would be dependent upon pressure.

Q. 580. And that pressure in both these plants also caused responsive action of the air-chamber? Is that not correct?

A. Yes, sir.

Q. 581. Now, referring, if you wish, to Complainant's Exhibit "Power Development Company Plant during Construction", or Complainant's Exhibit "Exterior of Power Development Company Plant", or to any other drawing you have in hand, will you for the purpose of the record state as closely as you can what the dimensions of the air-chamber at the Power Development Company plant were?

A. I should say it was 30 inches in diameter and 16 feet high.

Q. 582. Will you please refer to "Defendant's Exhibit Swiss Patent," and "Defendant's Exhibit Translation of French Patent," and state whether the governing action as you understand it of both the Swiss patent structure and also the French patent structure would accomplish a governing action upon a water-wheel gate which would be different from the governing action upon a water-wheel gate operatively connected with the shaft D-E of Complainant's Exhibit Z, as produced by the governing elements shown in said exhibit? And if so, what different governing would occur?

A. All three of these exhibits provide governing action. In all three of them the initial governing feature is dependent upon a change of speed only.

Q. 583. In this question I am referring, as I did yesterday in my questions, for similar comparison as between the North Star plant governor and the Power Development Company plant governor, and this Complainant's Exhibit Z, with respect to the returning action or controller-valve operations.

A. I testified exactly in respect to a question similar to that yesterday, and it shows on the record what my view of that matter is, but I will try to repeat the same now for your edification, as follows—

Q. 584. Unless you want to, I don't want to go back to those Exhibits. But I want you to similarly compare the French and Swiss, as you did the other.

A. You want me to compare the returning action on these two with that one?

Q. 585. Yes; the same as you did on the North Star and Power Development Company.

(Questions 582 and 583 read by the Examiner.)

A. I am a little mystified as to what the attorney wants. I would like you to put the question so that I will know what you want me to answer.

812 4 after "patent" add "and defendant's exhibit translation of Swiss patent defendant's exhibit French patent"

plant with the governing action of the device which you discussed as shown in Complainant's Exhibit Z, and, particularly, with respect to the returning action and its effect upon the controller valve. Now, please make a similar comparison between the disclosures of "Defendant's Exhibit Swiss Patent" and "Translation of Swiss Patent", if you wish to refer to the same, and "The French Patent" and "Translation of French Patent" if you wish to refer to the latter and this Complainant's Exhibit Z. Will these Swiss and French patent devices produce any different effects in these respects than the device of Complainant's Exhibit Z and, if so, please state what.

A. Referring to Complainant's Exhibit Z, the action of the governing mechanism there shown in governing motion to the quadrant D-E is practically the same as that shown in the French patent referred to, and a governor to the arm x by the mechanism there shown. The mechanism shown on Complainant's Exhibit Z and giving motion to the quadrant D-E is not similar to the motion shown by the governing mechanism in the Swiss patent in evidence, because if motion given to the quad-

A. I should say it was 30 inches in diameter and 16 feet high.

Q. 582. Will you please refer to "Defendant's Exhibit Swiss Patent," and "Defendant's Exhibit Translation of French Patent," and state whether the governing action as you understand it of both the Swiss pat-

on a water-wheel gate operatively connected with the shaft D-E of Complainant's Exhibit Z, as produced by the governing elements shown in said exhibit? And if so, what different governing would occur?

A. All three of these exhibits provide governing action. In all three of them the initial governing feature is dependent upon a change of speed only.

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A. You want me to compare the returning action on these two with that one?

Q. 585. Yes; the same as you did on the North Star and Power Development Company.

(Questions 582 and 583 read by the Examiner.)

A. I am a little mystified as to what the attorney wants. I would like you to put the question so that I will know what you want me to answer.

Q. 586. I will re-state the question. Yesterday you compared the governing action of the governors of the North Star plant and the Power Development Company plant with the governing action of the device which you discussed as shown in Complainant's Exhibit Z, and, particularly, with respect to the returning action and its effect upon the controller valve. Now, please make a similar comparison between the disclosures of "Defendant's Exhibit Swiss Patent" and "Translation of Swiss Patent", if you wish to refer to the same, and "The French Patent" and "Translation of French Patent" if you wish to refer to the latter and this Complainant's Exhibit Z. Will these Swiss and French patent devices produce any different effects in these respects than the device of Complainant's Exhibit Z and, if so, please state what.

A. Referring to Complainant's Exhibit Z, the action of the governing mechanism there shown in governing motion to the quadrant D-E is practically the same as that shown in the French patent referred to, and a governor to the arm x by the mechanism there shown. The mechanism shown on Complainant's Exhibit Z and giving motion to the quadrant D-E is not similar to the motion shown by the governing mechanism in the Swiss patent in evidence, because if motion given to the quad-

rant D-E on Complainant's Exhibit Z were used to operate the water-wheel gate and by-pass valve, they would have to operate exactly in unison. But the mechanism shown on the Swiss patent corresponding to the mechanism just referred to, while it operates the water-wheel gate and by-pass valve, the mechanism for ^{the} ~~meeting~~ said water-gate and said by-pass valve is not a rigid connection and gives opportunity for slight deviations from exact action in unison.

Q. 587. But as far as the governing action is concerned, considering now, if you wish, that there is separate governing action attaching to the by-pass and the water-gate features of the Swiss patent, does this Swiss patent introduce any governing effects which are not found in the governing features of Complainant's Exhibit Z?

A. I consider all three of these exhibits strictly with regard to their governing effects, which as previously stated, can be brought about only by changes of speed, and they are all three similar in that particular respect, that due to changes of speed they will product governing action on the water-wheel.

Q. 588. And these governing actions are corresponding actions, are they, in nature and effect? *And*

A. They are not. I say they are not because I ^{know} by Complainant's Exhibit Z what quadrant D-E operates. I have no means of knowing what it operates, so I have no knowledge of what may be the action of governing.

Q. 589. Well, stopping the inquiry at that quadrant, please answer my question simply as to the governing

actions themselves, irrespective of the particular device or part which is so governed.

A. Where will I stop the consideration in the Swiss patent?

Q. 590. I mean leave the by-pass out.

A. Where will I stop it in the French patent if I stop it at the quadrant? Do I leave out the rocker-shaft?

Q. 591. No. That is part of the mechanism. That is, in considering all these three exhibits, leave out any particular consideration of the nature of the part which is governed, and confine the answer simply to the governing action, and then please answer the previous question.

A. These governors all act due to a change of speed and to no other initial cause, and their control of the water-wheels beyond that feature is different in each case cited.

Q. 592. But can you draw any distinction between the governing effects as ~~to~~ those effects are imparted to the governed parts?

A. Do you mean by the word "effects" simply to change the speed of the wheel, no matter how done or how accomplished?

Q. 593. Yes; I do. That is, irrespective of the connections between the governing features and the wheel-speed-changing features.

A. That does not clarify the condition at all, because I have no idea what the Swiss patent changing features are on exhibits or contemplated by Exhibit Z.

Q. 594. I am entirely eliminating that feature from the question.

A. It don't appear to me so.

Q. 595. Well, put it in another way. Please compare these three exhibits as to the actions of the governing features, stopping short of the governed features, whatever they may be.

A. They are very similar in action, each of them being controlled primarily by change of speed. Each of them shows a valve for controlling the supply of liquor under pressure to certain power-developing mechanism; and each of them shows means for controlling that valve to correspond with changes of speed or to maintain the position of that valve at uniform speed.

Q. 596. And is any different result obtained by either one contrasted with others, as far as the final step in the governing performance is concerned, as distinguished again from the governed part or device?

A. There is no similarity in these devices Complainant's Exhibit Z, the Swiss patent and the French patent, beyond the points mentioned in my last answer.

Q. 597. Assume that the same gate or governed device be hooked up with the governing features of each and every one of these three exhibits, that is, the parts that do the governing, will there be any didifferent governing effect imparted to such same governed features?

A. There will.

Q. 598. Please state what that difference will be.

A. Defendant's Exhibit "Swiss Patent" controls the supply of water to the water-wheel and by-pass valve in the penstock in a different manner from the control of water to the wheel and escape of water from the by-pass shown by the French patent, and in both these patents by means that are not locked rigidly to each other by

rigid connections. Whereas, in Complainant's Exhibit Z, if the quadrant operating around shaft D-E operated the water-wheel gate and by-pass valve, they would perforce act in unison.

Q. 599. Is that the only distinction affecting the last question which you wish to make?

A. As I understand the question it is, in view of what I have previously stated with reference to these exhibits.
April 10, 1914, P. M.

Q. 600. Referring now to Complainant's Exhibit Lyndon patent, and having in mind that you have testified that you were not expert in things electrical, I will ask you if you can point out any part or feature of the Lyndon patent disclosure which you can state or are willing to state is inoperative.

A. Theoretically the Lyndon patent appears to be operative.

Q. 601. There is no part of the Lyndon patent disclosure which in its ultimate action is not responsive to mechanical actuation, is there?

A. The speed governing of the Lyndon patent is not mechanical.

Q. 602. Well, I am talking of the ultimate movements of parts. Wherever a part moves and does any work in this device, such work is mechanically performed, isn't it?

A. Well, the closing of the friction clutches is not mechanically performed. Mechanical work cannot be done on the valves by reason of driving efforts of the water-wheel shaft.

Q. 603. Please point out on the Lyndon patent any

friction clutch which is operated without the intervention of a lever or like mechanical element.

A. I don't believe I can. But one end of a lever or like mechanical element receives its operating force from electrical connection.

Q. 604. And, likewise, the other or business end operates under the mechanical law of operation of such part, does it not?

A. It would move if the lever had power enough supplied by the electrical element. The lever has no power-generating function within itself.

Q. 605. And, as a matter of fact, so far as the effect of such lever connections is concerned, it does not make any difference whether the end at which it is actuated is pushed or impelled or actuated by another lever or like part or by any other thing, force or influence which produces this movement? Isn't that correct?

A. It is not so in the Lyndon patent. You have got to have it moved by electrical force.

Q. 606. In the action of such lever is there any difference in the result of the action whether the force imparted be through a mechanical agent or an electro-magnetic agent?

A. I think a purely mechanical agent would be much the more reliable and certain.

Q. 607. There is no chance for lost motion or slippage in an electrical circuit, as you understand it, is there?

A. I don't understand one way or the other about that.

Q. 608. Well, supposing you have a circuit including

an electrical path a mile long. The moment that circuit is closed and that path is energized, there is substantially instantaneous corresponding action in the working device so energized, isn't there?

A. Provided the circuit is of sufficient size not to offer too much resistance to the energization.

Q. 609. And any electrician would provide such a circuit, whether it was for ringing a bell or releasing a door-latch, or any other purpose, wouldn't he?

A. He might if he knew enough to.

Q. 610. Isn't that a type of electrical control depended upon under conditions requiring most reliable responsiveness, as, for instance, in operating railway signal semaphores, and the like?

A. No, sir; it is not as reliable as the old hand lever semaphores, by any means. I know that of my own knowledge.

Q. 611. As a matter of fact, isn't within your observation the electrical control of such railway signalling apparatus coming more and more into vogue?

A. I believe it is, but because of its cheapness and the fewer number of men required to push buttons than the number required to pull levers.

Q. 612. Still such control is relied upon under those conditions? That is correct?

A. What I said is correct.

Q. 613. I think the court will take judicial notice of such things, only I wish to ask you in this connection to state whether you do not think such actuation, that is, through an electrical path for a distance say ordinarily of a mile or more, would not be more positive and quicker

and liable to less slippage or lost motion, if you can assume any such lost motion in an electrical transmission, than would a mechanical transmission through the same distance.

A. No reason why one should be quicker than the other.

Q. 614. Did you ever hear of a water-wheel governor known as Lightite's electrical governor for water-wheels?

A. I have.

Q. 615. Did you ever examine one?

A. I never did.

Q. 616. Did you ever see it in operation?

A. I never did. I have read articles about in in publications.

Q. 617. Now, when you say that the Lyndon patent device is not practical, please state what you wish us to understand by that.

A. I have stated that I would not accept the device disclosed in the Lyndon patent as a practical water-wheel governor. I think, in my testimony, and if I have not made it clear I again repeat it: that I would not accept the device disclosed in the Lyndon patent as a governor to be relied upon for the reason, among others, that I place no confidence whatever in electrical contacts made by normal pressure without motion, for one thing. I place no confidence in friction clutches not definitely and mechanically closed. That is sufficient to condemn his disclosure from any acceptance on my part as being reliable.

Q. 618. And you wish to take the same stand, do you, or as far-reaching a stand in connection with all means

and mechanisms in which friction clutches and electrical control figure?

A. I am speaking of the disclosures of the Lyndon patent only.

Q. 619. Would the same objections be raised by you against any other class of apparatus containing these features?

A. Constructed in the same way as shown in the Lyndon patent and operated in the same way as the Lyndon patent, yes.

Q. 620. But you have no particular objection to the inclusion of these features in a device such as the Lyndon device?

A. I have objections to the device that I particularly enumerated, operating as I particularly stated, regardless of whose devices they are, but disclosed in the Lyndon patent.

Q. 621. In other words, ^{if} take it you would prefer to have something else substituted for these features.

A. I would not accept the device as disclosed and operated as shown in the Lyndon patent. I would certainly have something else. I will say further, in connection with that, that I don't believe the Lyndon patent, with my judgment of such construction, has ever been put in operation in any way, shape or form.

Q. 622. You are now referring to the particular construction—

A. I am referring to the disclosures of the Lyndon patent as set forth in that patent and shown in its drawings. I don't believe the thing has ever been operated.

Q. 623. Your criticisms, I take it, do not go to the

effectiveness of the purely mechanical parts of the disclosure?

A. I am speaking of the device as a whole and developed as a water-wheel governor. Taking every feature and everything as shown and described in the Lyndon patent, I say it is not a practical governor, and that I don't believe the thing has ever been put into operation.

Q. 624. Your objections do not go to such purely mechanical parts of such Lyndon construction through which the ultimate motions are imparted in the governing actions, such as the shaft 12, the shaft 6, the shaft 20, the clutch-gears 9, 10 and 11, and the returning device, including the parts 49, 50, 51, 52, 53 and 70, shown in Figure 1?

A. Yes, sir; it covers them all.

Q. 625. It wouldn't make any difference to you how these parts were set into motion, you would still object to them as being unsatisfactory means for connecting up the water-wheel with its gate and the by-pass valve?

A. Certainly I object to them, because they are connected up by the aforementioned friction clutches controlled and operated by electrical connection in the manner set forth in the patent.

Q. 626. If these parts were set into motion in some way which would come within your approval, would you still register objections against them?

A. I would not recognize the Lyndon patent in such a device or covering such a device as I would have when I got through.

Q. 627. But if the Lyndon patent goes beyond mere

questions of electricity and friction clutches, I take it that these objections would not be insisted upon.

A. That depends on how far beyond the disclosures of the Lyndon patent he would carry his construction.

Q. 628. And I suppose, therefore, you would register no objection against a water-wheel governor which employed purely mechanical means for connecting a water-gate with a by-pass valve and a governor so that the by-pass valve operated inversely to the water-gate? Would that be all right?

A. It would be all right, using the elements you have specifically mentioned in your question, and as long as the designer kept away from electrical features and friction clutches.

Q. 629. In organizing such a mechanism you would not object, unless you found some other specific features which were objectionable?

A. I would have to go over the plant and see if I liked it or not. I can't imagine what kind of a construction is in your mind by the question you ask. But I would not accept it unless I saw it laid out.

Q. 630. Well, if you were asked to set up a water-wheel governor or governing mechanism combining a water-gate with a by-pass valve and a governor per se, so inter-related that the by-pass valve operated inversely to the operation of the water-gate, you would be able to lay that out on the board?

A. I think so, and if I wanted to point to a design of that character which I know was successful in operation and which was never excelled as a water-wheel governor, I would point you to the design shown in the plant of the Power Development Company at Bakersfield as it was

originally laid out, in its principles of construction and operation.

Q. 631. And that was so unexcelled in its operation that it became buried in oblivion, so far as you know, at least before the year 1903?

A. It may have been for all I know buried in oblivion two months after I left it, but that does not make a particle of difference in the merit of the governor. Many things are turned down by people who are not able to use them as I would be able to use them in their particular construction.

Q. 632. Don't you think, following your consideration of these governor matters in this case, you would be able to set up such a mechanism which might last longer than a few months?

A. There was nothing about the Bakersfield governor that would give out in a few months due to its design or theory of construction at all.

Q. 633. But, nevertheless, it was so defective that you had to report against its adoption?

A. The governor mechanism was not defective, and I did not report against the adoption of the governing mechanism.

Q. 634. I mean you reported against the adoption of it in the form in which it was installed.

A. I reported against the adoption of it as a whole unless they changed the construction of the by-pass valve which was not of itself a governing mechanism. It was only one element making up the whole construction, the same as a broken wire might have been defective and re-

quired replacing, if installed as disclosed in the Lyndon patent.

Q. 635. And I suppose you found that defective from the same standpoint of engineering judgment that you utilized or that you relied upon in objecting to the friction clutch, for instance?

A. No, sir, not at all. The by-pass valve at Bakersfield was defective because of its form. It clogged up easily with sand from the water. It was not defective as a by-pass valve but defective on account of the condition of sandy water.

Q. 636. It was efficient for the purpose for which it was installed in that plant?

A. No, sir; it by-passed the water all right when there was no sand in the water.

Q. 637. And wouldn't the friction clutch work all right if it is properly set and everything is correct?

A. If you have the proper means for setting it.

Q. 638. You have ridden in an automobile driven by a friction clutch?

A. Attempted to sometimes; yes, sir. They were not set up by electricity, either.

Q. 639. I suppose you are more or less familiar with the operation of the electric telegraph, are you not?

A. I am not a telegrapher. I have seen instruments and illustrations of them, but I am not an operator, and, to tell you the truth, I don't know anything about them that anybody else don't know.

Q. 640. Do you consider that any part of the Lyndon device which is electrically responsive or electric-magnetically responsive would be required to do more

accurate and long continued work than an electric telegraph instrument as installed in a busy office?

A. I have seen electric telegraph instruments hanging all day and they frequently slipped a sheet of paper through them and wiped off the contact points, and they can bring exceedingly strong pressure on them, and they carry almost an infinitesimal flow of juice compared to a power line. But there is not enough juice to bring up burning or short-circuiting operations, or anything of that kind whatever. But there is another thing. Their points of contact are made of non-corrosive materials, so far as I know, or else they are very hard steel, which amounts to the same thing. I have seen them with different kinds of contact and the use of telegraph instruments is nothing at all like expecting similar contacts to be made in a mechanical plant by the doubtful action of those pieces.

Q. 641. In spite of that, it is a reliable instrument.

A. If it does not respond to the action of the key operator he knows it and fixes it so that it does.

Q. 642. As far as the general disclosure of the Lyndon patent is concerned, you have stated, I believe, that it is theoretically correct. Will you state a little further as to that.

A. I mean by that that one can draw out or delineate a relation of operations as is done in the Lyndon patent that on the face of them and on the paper one would say will work and that will work, and, therefore, as I said, it will work. Practically such a delineation may be so full of little confounded adjustments and doubtful contacts and weak internal connections and motions too delicately

dependent upon those motions to take place in given times, that I still am and always will be of the judgment that any device constructed as disclosed in the Lyndon patent is impracticable to use for operating.

Q. 643. If you had the Lyndon patent placed before you without any other preparatory knowledge concerning water-wheel governing and you read Claim 6 of the patent, which I will not repeat, would you be willing to rely on your engineering skill to set up a satisfactory mechanism which would embody what is stated in that Claim 6 and would work?

A. If I had no previous knowledge of the construction of water-wheels or water-wheel governors except what I would obtain from this patent in question, I would not find in Claim 6 a very good description of a mechanism as disclosed in the drawing. But it is hard for me to tell how I would read that claim if I knew nothing about water-wheel governors, because I have made a good deal of a study of water-wheel governors heretofore, and they naturally enter into my judgment of what that claim reads to me now. And with my knowledge of the art I could construct a water-wheel governor by reason of Claim 6 very easily.

Q. 644. Suppose you had no source of information or knowledge to assist you, including the Power Development Company installation, the Lamb patent and the Swiss patent and the French patent referred to in these proceedings, but had all the rest of the knowledge which you have enumerated in your long experience in water-wheel work, wouldn't you trust yourself to set up a mechanism which would do what that claim states?

A. I didn't understand that to be the original question. I can set up a mechanism at any time to govern a water-wheel and do it by operating on the water-gates and on the by-pass.

Q. 645. Just as stated in that Claim 6?

A. I won't say about that directly, but I could set it so that Claim 6 would fit it pretty good, I guess.

Q. 646. Supposing I came to you, we will say, in 1893, and I said: "Mr. Cobb, I have a water-wheel up here in the hills and I wish to govern it, and I wish you to build me a governor which will be responsive to any kind of speed-sensitive device which you wish to select, such speed-sensitive device being driven by the water-wheel shaft, and I wish you to provide in the penstock a by-pass with a by-pass valve, and I wish you would provide means for operating the water-gate in either direction, and I wish you to connect up with those means the by-pass valve so that it will move inversely to the movements of the water-gate." Away back there in 1893 couldn't you have turned me out such a piece of mechanism on that order?

A. I shouldn't wonder if I could.

Q. 647. And you would have been willing to specify it and guarantee its operativeness?

A. I would determine that question after I had my drawings made. I wouldn't make any guarantee—

Q. 648. You would have taken such an order in good faith?

A. I would certainly have tried to fill the bill in good faith. Later developments would show whether I had filled it or not. I don't work on perpetual motion ma-

chines when I see they are perpetual motion machines, but I can attack any problem brought to me and make an effort at its solution.

Q. 649. Now, you have stated the objects that you believe Lyndon had in mind as reflected by the Lyndon patent, were to obtain a constant flow or pressure in the penstock at all times. Is this as far as you wish to go in stating the object of the invention as reflected by this patent?

A. That is as far as it is necessary for me to go in answer to any question that has been asked me in regard to it that I remember. I don't know whether I have stated anything about pressure in my previous answers or not, but I know I would have said it was to maintain uniform flow. I doubt if I used the word "pressure". I very much doubt that. I would have to be shown that in my testimony before I would be sure of that, because under certain conditions the pressure might be varied from outside sources.

Q. 650. Quoting question 125, commencing on page 572 of the record, I read as follows: "From the reading of the Lyndon patent I reach the definite conclusion that the object of this device was to maintain a constant flow, and, incidentally, a constant pressure in the penstock without regard to the quantity of water being supplied directly to the wheel at any instant. Consequently, my view of the effect is as stated—that the prime object of his device was to maintain uniform pressure in the penstock, irrespective of the quantity of water being supplied to the water-wheel at any instant."

A. That is enough. I understand that. That is true.

I don't deny that testimony at all and it is correct. I probably should have modified it at that time by saying when the pressure was not affected by any other varying force than that produced within the mechanism under discussion itself. That is all that I want to cover now. I still make that same answer now—that there is no other force in action other than that disclosed in the mechanism.

Q. 651. I assume that you do not deny another feature of the invention, namely, that that is set forth in lines 36 to 46 of the Lyndon patent, page 1, do you?

A. He was trying to accomplish the features therein mentioned.

Q. 652. You agree with him, do you not, that the over-running of governor action or governor-hunting is an objectionable feature of governor action, and that anybody who could or has substantially eliminated the same would have contributed something valuable to the art?

A. If the subject matter contributed was demonstrated in actual use to be superior to anything that had been done prior to that time, then he would have made a new contribution to the art.

Q. 653. Undoubtedly novel. But would you not consider that such contribution would be valuable?

A. It might or might not be. If it cost more to produce the result than the result was worth, it would not be valuable.

Q. 654. You admit, I take it, that this over-run or hunting the governor militates extremely against maintaining proper wheel speed, particularly in operating electrical generators supplying energy commercially?

A. It does in certain constructions. There are constructions of water-wheel governing devices where there is no such trouble as hunting the governor. There have been such constructions, I know, prior to the date of the Lyndon patent.

Q. 655. It is, however, a most unsatisfactory condition to have, is it not, under those circumstances? Namely, the possibility of the governor overrunning?

A. Any governing device that does not prevent or so control or any system of arrangement of water-wheel plant that does not largely or wholly prevent governor-hunting, is unsatisfactory.

Q. 656. If you ^abecame convinced that as a fact that in the best and most skillfully designed hydro-electric plants being installed today air-pressure chambers serving the purposes of that which was part of the installation of the Power Development Company plant, are not provided or specified, would you have any explanation to make in view of your testimony that you consider such air-pressure chamber an advisable adjunct of such hydro-electric plants under all circumstances?

A. With such experience as I have had with them, I would always put on the air chamber. I don't know of any conditions today where I would not recommend the same thing for the same purpose that I recommended it in years gone by. The fact that engineers construct any particular proposition one way or another, is immaterial to me personally. If I tackle a problem I work it out in my own way. If I have got to be responsible for its results, I use my own judgment and not the

judgment of the other fellow as to how it is to be constructed.

Q. 657. You have stated that the Lyndon patent disclosure set forth, as nearly as I can put it without quoting the question, and to the best of my memory, nothing in kind or in function which was not provided for in the Power Development Company's plant. Now, in that plant the by-pass valve always had to follow the water-gates in accompanying movement, did it not?

A. It didn't follow. It moved exactly with them.

Q. 658. And in the Lyndon patent there is clearly disclosed means for restoring the by-pass valve to normal position after it has moved jointly with the water-gate? Is that not so?

A. That was equally true in the Bakersfield construction.

Q. 659. Do you mean to say that in the Bakersfield construction the by-pass could move independently of movement of the water-gates?

A. No, but they all had to return to normal position the same as they do in the Lyndon patent. When you get the regulation back to normal speed you have to get all the governor parts back to normal position.

Q. 660. But the by-pass valve of the Lyndon patent can move after the gate has come to its final position of adjustment, can it not?

A. Yes. I don't know as it would be its final position or not, but to some position where it would remain for a moment. That is to say, they are not fixed mechanically connected.

Q. 661. And means are shown in the Lyndon patent

for causing a movement of the by-pass after the governing movement of the gate has ceased, isn't that correct?

A. As I remember it, yes. Such a construction provided in the Lyndon patent and also in the Swiss patent.

Q. 662. So that the by-pass valve of the Lyndon patent could have a normal position to which it would always return? That is, the same position, after the governing movement of the gate had ceased? Is that not correct?

A. The impression is given here somewhere in the patent which I will try to find, that no matter where the gates are with reference to being open or shut, or whether the water-wheel gates are wide open or almost closed, in order to provide the quantity of water on the water-wheels required for large or small loads, that the by-pass valve represented by the butterfly valve at 48 assumes a position half-closed. Those conditions like that, if that is true with all positions of the gate, is what I want to determine in answer to your question.

Q. 663. You may take time.

A. I read it over a week or ten days ago, and my impression is that it went to a point half-way open. On page 4 of the Lyndon patent at line 35: "Normally the gate or valve in the by-pass will be half-way open, so that the amount of water flowing through the by-pass and around the wheel without doing work will be half the amount which the by-pass is capable of carrying." And, again, on line 80 of page 4: "After the governing takes place the by-pass gate is either open or closed, or nearly so, and in order to be useful for a second governing must return to its normal position. It, however, must return

slowly in order that the effect of increased or decreased speed of water through both the by-pass gate and the water-wheel gate will not take place." That is where he was trying to keep the velocity in the penstock and the pressure uniform. Now, as this is drawn—as the perspective seems to show it in the drawing—I think he was trying to show that gate was just about half open. It is shown in a bad position. If it ~~were~~^{were} looked at directly in line with the shaft you could tell. But a butterfly valve for that position is half-open when it lies pretty near quarter-way across the pipe. That is to say, the plane of the valve would make an angle of about 40 degrees with the axis of the pipe when it is half-open.

Q. 664. Will you please state what you have meant us to understand as your definition of mechanical equivalents, or what you now wish us to understand you to mean by mechanical equivalents or mechanical equivalent in connection with your testimony previously given?

A. Mechanical equivalent construction as understood by myself would mean to make that construction by virtually the same means, in virtually the same manner, produce the same results.

Q. 665. How virtually the same would you have us understand the means must be?

A. Obviously the same to the casual student.

Q. 666. Would you consider that a cam and a toggle-joint which both operated to produce substantially the same results in two machines would be mechanical equivalents?

Mr. Westall: Objected to as not proper cross-exam-

ination. Also as requiring the witness to give opinions as to matters which are for the court. And also for the further reason that the question is not complete enough for the witness to understand the position, the location and the particular mechanism in which the particular elements referred to were connected. Also, because it does not take into consideration whether the invention or device referred to in the decision that the counsel is reading from the card to the witness involved a pioneer invention or one in a highly improved art, and because it calls for matter of opinion of the witness that is entirely outside of the scope and functions of expert testimony.

Mr. Blakeslee: We object strenuously to counsel coaching the witness by any such statement as that made that counsel is reading any law from anything whatsoever. We do not wish the witness to be put upon his guard against fair cross-examination, and we deny that counsel has been near enough to the interrogator to tell what he was reading from or what he was reading, and as to the purpose of this line of questioning it is manifestly that we may find out what this witness has meant by the use of the terms "mechanical equivalents" and the like, which expressions were used by him responsive to questions put by counsel for the defendant. We are not trying to establish any law in this inquiry. We are merely trying to find out what the witness means, so that the court may know what he means, and when it comes down to a final determination of what is or what is not the mechanical equivalent of something else, that, of course, subject to the record, is for the court to de-

termine. We now ask that the question be read and answered.

Mr. Westall: It is to be noted that counsel was stating that in his belief counsel for defendant was not near enough to know what was being read from, but he does not deny that he was reading from a card patent digest and endeavoring by partially quoting matters of law to have the witness place an interpretation upon the law of mechanical equivalents without having the full circumstances and full position and the nature of the invention laid before him. Therefore the objection still stands to counsel calling for matters purely of law.

Mr. Blakeslee: The court will recognize that counsel is again coaching the witness, for if there be any truth in what counsel says as to the nature of the cards he refers to, his remark can have only one result, and, in any event, there can be but one conclusion in the mind of the witness, namely, that he had better be careful and, possibly, secretive, and act with avoidance in his answers for fear that he may fly in the face of the law. This is not considered a fair position to put the witness in, any more than it is considered a fair position to put counsel for Complainant in. We will now ask the question to be re-read.

A. In answering this question I wish to say that I am going to answer it just exactly as I started to answer it when it was first propounded, without any reference to any remarks I have heard made since by either counsel for Complainant or counsel for Defendant, which is to the effect that I cannot determine whether or not I regard them as mechanical equivalents to one another with-

out a more complete knowledge of the positions in which they were acting, and the purposes for which they were acting, and the motions which they were transmitting.

Q. 667. By Mr. Blakeslee: Now, Mr. Cobb, let us suppose that, coming down to things right before us, you were to substitute a cam or a toggle-joint for the electro-magnet 32 in Figure 1 in the Lyndon patent in suit, to move the lever 24 by acting on the armature 31, which is a cross-piece on the end of that lever, such toggle-joint and such cam being constructed each so that rocking movement of that lever would be effected, which would be the same kind of rocking movement imparted by electro-magnet 32, and so that the clutch members 22 and 23 would be brought into engagement in the same manner as brought into engagement under control of the electro-magnet 32. Would you consider such cam to be mechanically equivalent to such toggle-joint and such toggle-joint to be mechanically equivalent to such electro-magnets and such electro-magnets to be mechanically equivalent to such cam, for the purposes set forth?

A. I would not.

Q. 668. Would you consider either one of them equivalent to either of the other two?

A. No. I don't see right off hand how I could use a toggle-joint to give reciprocating motion to the end of that lever. I don't see just where I would connect the other end of the toggle joint if I had one end connected to the armature 31.

Q. 669. Assume that you had it mounted on the frame or bracket so that its action could be applied to

that armature 31, and you operated the toggle-joint manually or in any way to give it its throw?

A. Well, in any case I don't think it would be equivalent to the magnet.

Q. 670. Would it be equivalent to the cam?

A. It depends how the toggle-joint was operated and how the cam might be operated. I don't know about that. But it is not the equivalent of the electro-magnet.

Q. 671. Please state why.

A. Because it is not operated by practically the same means. It is operated in one case mechanically and in the other case electrically.

Q. 672. And you think those things are not equivalent, assuming that they both do their work?

A. I say, in my judgment, they are not equivalent because they do not perform the work by the same means.

Q. 673. In other words, the means must be identical?

A. They must be both mechanical or both electrical, but one cannot be mechanical and the other electrical and both be the same.

Q. 674. Then I think we have your position clearly defined, namely, that if a thing is electrically actuated it cannot be, in your opinion, considered to be equivalent to the same thing mechanically operated. Is that right?

A. I won't accept that view of it in such broad terms.

Q. 675. Please differentiate any way that you wish.

A. I differentiate it very clearly in my answer to the previous question.

Q. 676. If three of these levers 24 were mounted in a row, all of the same weights and having the same fulcrum points or a common fulcrum, such as a shaft, and

one were oscillated by a suitable toggle-joint and one oscillated by a suitable cam and one oscillated by electro-magnets 32, and they all worked in step and produced the same amount of work, and those operations were continued for a substantial period of time, would you state that each of those three groups were mechanically different from and not mechanically equivalent to the other two of those groups?

A. I most certainly would, because taking up part of your question it would be practically impossible to make them act always in step.

Q. 677. If the toggle and cam were driven from a common prime mover and the electro-magnet 32 were energized subject to a timer actuated by this common prime mover, could they not be operated in step?

A. No, sir.

Q. 678. All could be brought in their operations within a given period of time for each operation, could they not?

A. Yes, that could be done. But in any case the electrical one could be made to act instantaneously and the other could not.

Q. 679. In other words, it could be made to act more promptly than the cam of the toggle?

A. It would attempt to act quicker. It would attempt to act instantaneously.

Q. 680. Well, if it did act instantaneously, wouldn't it be apt to add a little to the responsiveness?

A. It might not be under certain circumstances desirable to have such rapid responsiveness.

Q. 681. But such desirability attaches to the operation of a water-wheel governor, doesn't it?

A. In your citation you do not determine that it was attached to a water-wheel governor when you discussed the question of cam and toggle.

Q. 682. No, but I make that qualification now.

A. Quick action certainly is some of its elements is desirable in water-wheel governing.

Q. 683. Now, in discussing the various complainant's exhibits, being photographs E to L, you have referred to certain returning mechanism, including in your testimony the certain parts referred to generally as a dashpot, and you have also referred to several other features including, I believe, a hydraulic or oil cylinder which operates the train of mechanism leading to the by-pass and gate. Do you recognize the parts I refer to?

A. I think so. I am guessing at what you refer to by what I think I said.

Q. 684. You also find in there, I believe, speed-sensitive devices consisting of fly-ball governor, do you not?

A. Yes, sir.

Q. 685. Which one of these parts before mentioned does the dashpot of the returning device affect in its action?

A. I could make an answer, but I could make it correspond to my former answer, so I would like my former answer quoted.

Q. 686. You refer to those parts.

A. I described the action during my former testimony in a general way, and their relationship to one another,

and I would like to get the start on what I said then and I will say it over again in the same way.

Q. 687. You may refer to your testimony. I don't want to pick it out for you. You can take the record if you wish.

A. Why wouldn't it do for me to say that I had already answered that question in my previous testimony?

Q. 688. By the parts before mentioned, I mean the speed-sensitive fly-balls and the cylinder which operates the train of mechanism.

A. Now I get your idea. The parts referred to as dashpot, as its piston rod represented by XX on Exhibit J, and by L on Exhibit E. The action of this dashpot with its enclosed piston and with the connection of its piston rod L to the operating mechanism of the water-wheel gate and by-pass gate, and with its connection also to a certain rack and pinion not clearly shown on these Exhibits but clearly shown on Exhibit Z, heretofore referred to, acts in conjunction with the fly-ball governor referred to and with the returning fingers and returning spring shown below the pinion and rack UU-J on Exhibit Z, to return the balanced line-to-line valve controlling the motion of the piston in the hydraulic cylinder WG, to a central position, regardless of the instantaneous position taken by the balanced line-to-line valve, due to the action of the fly-ball governor having been acted upon by an increase or decrease of speed.

Q. 689. Now, in Complainant's Exhibit ZZ, do you find a corresponding rack and pinion and a corresponding cylinder and piston with the line-to-line valve and dash-

pot or the like to move the piston in the cylinder through the rack and pinion, independent of the action of the fly-balls?

A. I do. The details of construction of the so-called dashpot as shown on Complainant's Exhibit ZZ are not the same as the details of construction on Complainant's Exhibit Z. Otherwise these exhibits seem to be identical. The operation of the dashpot as shown on Complainant's Exhibit ZZ will be different in its rate of operation, so to speak, at least when operating in one direction, from the speed of operation when constructed as shown on Complainant's Exhibit Z.

Q. 690. Which of these dashpot showings, namely, in Exhibit Z or Exhibit ZZ, corresponds more closely with the dashpot you have referred to in the photographs E to L?

A. So far as I can make out from an inspection of Exhibit E and Exhibit J, the Exhibit ZZ conforms more closely to the construction there shown in so far as the dashpot itself is concerned.

Q. 691. And how with reference to Exhibit K?

A. I should judge Exhibit K to represent the same construction of dashpot as shown in Exhibits J and E. I am not altogether clear about this, as I can only see in these exhibits the top three screw-heads or valve-stem heads to make me thus form a conclusion. If there were any view here which would show in the photograph the notch element ZZ shown on Exhibit ZZ, I could be more certain as to whether or not these constructions were identical.

Q. 692. And how with respect to Complainant's Exhibit W?

A. The dashpot in connection with Exhibit W corresponds in general features with the dashpot shown on Exhibit ZZ.

Q. 693. And how with respect to Exhibit KKK?

A. In all essential features the Exhibit Dashpot Ee and rack F, spring L and piston rod G, shown on Exhibit KKK, corresponds with those shown on Exhibit ZZ.

Q. 694. And how with respect to Exhibit X?

A. So far as I can observe in the illustrations on this Exhibit the Exhibit ZZ is similar in its dashpot construction to the dashpot construction shown on Exhibit X. My answer applies only to the construction of the dashpot itself with its thumb-screws for adjustment and its cam which is marked 81 on Exhibit X and which said cam is marked ZZ on Exhibit ZZ.

Q. 695. Now, in Complainant's Exhibit E, KKK, LL, ZZ and J, you find in each and every one of them this dashpot device which is more similar to the dashpot device of Complainant's Exhibit W than it is to the dashpot device of Complainant's Exhibit Z?

A. I do.

Q. 696. Now, referring to all these last mentioned exhibits, do you find in each of the same a water-gate operating shaft?

A. I do not.

Q. 697. In which one is it lacking?

A. Maybe my term for the shaft and your term are different. I don't consider a shaft operating a water-gate, the way I am thinking of it,—if it is nothing but a

rock-shaft. Do you intend by the definition shaft to indicate a shaft that simply transmits motion but which may not necessarily make a complete revolution?

Q. 698. I do. And in that sense include what is known as a rock-shaft.

A. I see in Exhibit E what I presume to be such a rock-shaft at D. I see in Exhibit J what I presume to be such a rock-shaft at LL. I see in Exhibit ZZ what I presume to be such a shaft at D-E. I see what I presume to be such a rock-shaft on Exhibit KKK at F. I see what I presume to be such a rock-shaft on Exhibit LL and which I now mark C.

Q. 699. Now, do you also in any or each of these exhibits find means for operating the shaft in either direction? If so, please point out in which and where.

A. In Exhibit E ~~on~~^{two} such means are clearly shown. In Exhibit J no such means are clearly shown. In Exhibit ZZ the rock-shaft D-E is operated by the hydraulic cylinder WG, which in turn has its motions controlled by the governing mechanism on Exhibit KKK, the rock-shaft F as operated from the hydraulic cylinder containing the piston A is marked on the exhibit. On Exhibit LL the rock-shaft Z is shown in mechanical connection through connecting rod and other rocker-arms and the quadrant and rack to a hydraulic cylinder which I now mark B.

Q. 700. In what respects are these features last mentioned not clear to you in Exhibits E and J?

A. In E all the parts necessary to get the rock-shaft D in mechanical connection to the dashpot M are not visible in the photograph, and on Exhibit J all the parts connecting the rocker-arm KK giving the motion to the

rock-shaft LL which would connect same to hydraulic cylinder FF are not visible.

Q. 701. Do you find the parts not portrayed in Exhibit J in Exhibit H?

A. It is clear enough to me that the rocker-arm shown at KK in Exhibit H is connected by means of the connecting rod II to another rocker-arm operating about the rocker-shaft HH, upon which are mounted the quadrant and rack, and with rack acting therein, GG being an extension of the piston rod of hydraulic cylinder FF.

Q. 702. And that satisfies the question as to this exhibit, does it?

A. I think so.

Q. 703. Referring again to these several exhibits, do you find in any of the same and, if so, where, a controller for the last mentioned operating means which is responsive to changes of speed of the water-wheel?

A. I would like to ask what you refer to as the last mentioned operating means? We have been talking about rock-shafts.

Q. 704. The operating means that were just located, namely, means for operating the shaft in either direction. That is what you just located.

A. That was the hydraulic cylinder?

Q. 705. Yes.

A. Now then, do I find any speed operating devices in connection therewith?

Q. 706. Any controller for it, responsive to changes of speed of the water-wheel.

A. Such a speed-control is shown on Exhibit H at CC; on Exhibit E at G; on Exhibit J at CC; on Exhibit

ZZ at 3 and on Exhibit KKK at C; and on Exhibit LL at A, as I now mark it.

Q. 707. Between the means which you have located for operating the shaft in either direction, and the part just pointed out, namely, the fly-ball element, do you not find another controller feature directly actuated by the fly-ball element in each of these exhibits?

A. I find another controlling feature that acts in conjunction, in connection to the rock-shaft heretofore mentioned and the fly-ball element heretofore mentioned to control the operating means.

Q. 708. Please point that out in these exhibits.

A. On Exhibit ZZ the balanced line-to-line valve marked 3, having valve-stem marked Y-G; on Exhibit KKK the part marked B; on Exhibit LL the part which I now mark D; on Exhibit J and on Exhibit E and on Exhibit H this part referred to is not observable.

Q. 709. In these three photograph exhibits do you not find that there is some such element present to cause the control of the hydraulic cylinder?

A. I have no doubt from the general appearance of these photographs that they have some such element in them, but owing to the general construction of the mechanism shown in the photographs, such particular pieces are entirely, if present, out of sight.

Q. 710. Do you see in these photographs such a case for such a valve as you have pointed out in the three blueprints?

A. I can't say that I do definitely.

Q. 711. Do you find in each of these exhibits, and, if so, where, a returning device for the controller which

you have pointed out, provided with a clutch connection to the operating shaft?

A. I do not find any clutch connection in any of these exhibits.

Q. 712. Then please point out the returning device if you find it.

A. I observe what I would call a returning device for the balanced valve mentioned in my previous answer, to be shown on Exhibit KKK by the dashpot having a piston E, together with its rack F. On Exhibit LL the mechanism shows at the point which I now mark E, and on Exhibit ZZ the part shown between the piston rod L-E and including the pinion marked UU-J and on Exhibit H the device is only partially shown and not lettered. On Exhibit E it is only partially shown, but the piston rod of the dashpot is shown at L. On Exhibit J the mechanism is partially shown by the adjusting screws YY on the dashpot, and by what I believe to be valve-stem VV.

Q. 713. Now, as previously testified by you, each of these returning devices has a part which you have referred to as a cam, has it not?

A. I see it marked on one of the exhibits "cam". On Exhibit X at 81 I find a part called "dashpot cam" which, as near as I can make out by the illustration on Exhibit X, corresponds to a similar construction shown at e on Exhibit KKK, and the other part marked ZZ on Exhibit ZZ, and the part within the enclosure marked E on Exhibit LL. It is not shown in recognizable detail on Exhibits H and E or J.

Q. 714. When the controller you have referred to in

these various exhibits moves from normal position, the shaft which operates the water-gate in either direction moves, does it not?

A. When the controller consisting of the hydraulic cylinder before referred to has its piston moving in either direction, the shafts operating the gates will rock in either direction.

Q. 715. By "controller" I am now referring to the line-to-line valve actuated by the fly-balls. Is it true in that case?

A. That must be true also, because that operates the hydraulic cylinder. It operates the piston within the hydraulic cylinder.

Q. 716. Now, in each of these exhibits the returning device which you have located is operated when the means of operating the water-gate operating shaft is actuated by that controller? Is that not true?

A. The returning device is set into condition for operation by any motion operating the water-wheel gates.

Q. 717. And when the returning device is set into condition will not the cam you have referred to as part of the returning device be actuated?

A. I cannot determine by the drawings alone just concerning that, but I think I can answer that more properly by reference to Exhibit W. As indicated by Exhibit W, it would.

Q. 718. Now, when that cam is so actuated in the movement of the water-gate operating shaft, under the control of the line-to-line valve, what, in effect, takes place with respect to the returning device?

It acts to relieve the pressure on one side of the piston in the dashpot.

Q. 719. And what effect is produced with respect to the movement of the dashpot as a whole?

A. It allows the same to move more rapidly as this cam is acted upon, or, to state it more clearly, when a motion of sufficient length longitudinally of the dashpot has been given to operate the cam and raise the valve that is operated by that cam, it relieves the pressure on one side of the piston within the dashpot and allows the dashpot to move with decreasing velocity to a position with reference to the cam which it had occupied before any motion whatever had taken place.

Q. 720. That is, it allows the dashpot to move with a variable rate, which is a retardation of the dashpot as it moves to its normal or zero position?

A. I don't think it is a variable rate, but it moves with a uniformly decreasing rate until it reaches its original position with reference to the cam.

Q. 721. And what effect has that upon the stem of the line-to-line valve which, as you have testified, is rotated by the rack and pinion F, for instance, in Exhibit KKK, when the dashpot moves?

A. It starts the balanced line-to-line valve towards its original position with a rapid motion, uniformly decreasing in speed, until its original position is occupied.

Q. 722. This is what is shown as occurring in the action of the parts shown in Complainant's Exhibit ZZ, is it not?

A. I think that is a fair drawing of the mechanism to perform the functions discussed.

Tuesday, April 14, 1914. 10 o'clock A. M.

This being the time and place to which the further taking of proof on behalf of defendant was formally continued at the conclusion of the taking of the testimony upon the last session, (informal notice having been given to the Examiner by solicitor for defendant that he wished the adjournment taken to Wednesday in place of Tuesday) the following proceedings were had:

Present:

Raymond Ives Blakeslee, Esq., solicitor for complainant.

Mr. Blakeslee: This being the hour and place to which the adjournment was taken for the purpose of resuming the cross-examination of the witness Cobb produced by defendant, and the witness not appearing for further cross-examination, and counsel for the complainant and the Examiner having endeavored without success to locate counsel for defendant and the witness Cobb through said counsel for defendant, counsel for complainant makes demand upon the record for the production of the witness Cobb at the earliest possible moment and requires of counsel for defendant notice of the readiness of said Cobb at the earliest possible moment, and requires new notice as to the taking of testimony of any other witnesses on behalf of defendant.

It is to be noted that counsel for defendant served upon counsel for complainant a notice continuing this matter over until another day, and the Examiner states that informal notification was given to him. As counsel stated

yesterday to the court, it is not understood to be the province of counsel for the defendant to thus arbitrarily withdraw a witness under cross-examination from the stand. These observations are made particularly to show the lack of diligence which counsel for the defendant is showing in this case. Counsel well knows that the complainant is here and is sacrificing his business interests in San Francisco for the purpose of being present at these proceedings, and that this is the second trip he has made here for that purpose in connection with the cross-examination of this witness.

(Thereupon the Examiner, of his own motion, adjourns the further taking of proofs on behalf of the defendant until tomorrow, Wednesday, April 15, at 10 o'clock A. M., at the office of said Examiner.)

Wednesday, April 15, 1914. 10 o'clock A. M.

This being the time and place to which the further taking of proof on behalf of the defendant was continued, proceedings are now resumed:

Present:

Raymond Ives Blakeslee, Esq., solicitor for complainant.

Joseph F. Westall, Esq., solicitor for defendant.

Mr. Westall: In response to the objection of record at the last adjournment of this case, counsel for the defendant simply states that he promptly on the 11th day of April served notice on counsel for the complainant of

the continuation of this cause, that receipt of that notice

was acknowledged and that no objection or any indication was given at all by counsel that he did not accede to the continuance. The cause, as the record shows, was postponed by agreement from last Friday until Tuesday morning, and it was only upon the discovery of other matters which had been overlooked by counsel for the defendant that the case was not continued until Wednesday, April 15. Therefore, in the absence of any objection or any indication on the part of counsel to the continuance, it seems unjust for counsel now to insist that the cause should have been gone on with at the time to which it was previously adjourned. I now produce the notice above referred to showing the acknowledgement of service thereof by solicitor for complainant, and ask the Examiner to file it as part of the record in this case.

Mr. Blakeslee: Under protest as to the attempted adjournment of the case, which protest was made by counsel for complainant in open court Monday, it certainly was the understanding that the case was to go on without any such attempted postponement. We simply mention this for its proper reflection upon the purported or alleged diligence of the defendant.

Mr. Westall: In view of the suggestion of the court at the time of the hearing of the motion to amend the answer in this case when it was agreed by counsel for complainant that the matters set up in the alleged amendment might be continued and that any order allowing the amendment should relate back to the time that the motion was originally made, counsel for defendant now suggests that a stipulation of that kind

be entered of record in this case so that there may be no misunderstanding as to the weight and effect of the objections heretofore noted on behalf of the complainant as to coming within the issues of the matters set up in the proposed amendment.

Mr. Blakeslee: As that stipulation was entered into in open court, we certainly consent to the entry upon the record of the stipulation made in open court, and the Examiner may take it from the records from the minutes of the clerk of the court of the session of Monday, the stipulation which he will there find, and which the clerk of the court informs counsel for complainant is in the minutes on this matter.

Mr. Westall: So that I understand if the amendment is finally allowed it is understood that it will relate back so as to save the record for all the testimony that has been taken on behalf of the defendant in this matter?

Mr. Blakeslee: The stipulation in the minutes speaks for itself as to this. If there is any objection to it, that can be made. But I believe that it correctly sets forth the understanding reached in open court on the session of Monday, and I suggest again that the Examiner copy that into the record as being the proper method of placing on the record that stipulation.

April 5, 1914 A. M.

Q. 723. Is it not quite common for water passing to water-wheels and the gates and by-passes thereof to have a floating content of silt or other finely divided material?

A. I couldn't say that it was common, because that depends upon the quietude of the water at the upper

*Edw S Cobb recall
direct from exam
revised by Mr Blakeslee*

end of the intake, and if the water is taken from a large reservoir it may come practically clean and clear at any time. Whereas if it comes from a running stream which is more or less turbulent in these mountain streams, then it does carry foreign matter, as I have previously stated, sometimes in very material quantities at certain times of the year or under certain storm conditions.

Q. 724. Did you not consider in 1897 that the pressure-regulating device of the exhibit "Cobb Pressure Regulating Device Circular" was a more efficient device for relieving extreme pressures in the penstocks than the air-chambers such as were installed on the North Star Plant and the Power Development Company plant?

A. The device set forth in the exhibit never would stop and never claimed to stop the first increase in pressure on the pipe-line, and it wouldn't do it, either. That was introduced in the pipe-line by reason of some exterior force acting upon the water flowing in the pipe-line. But it would prevent the action of the air-chamber from causing a return flow in the pipe which again following could again cause an increased pressure in the pipe-line. That is to say, in other words, that the first initial increase of pressure and ram in the pipe-line would be absorbed by the air-chamber shown in the Cobb device, and would consequently contain no inherent energy of rebound, or no acquired energy of rebound from the confined air in the air-chamber.

Q. 725. Whereas this rebound always took place in the air-chamber?

A. It took place to more or less extent, according to the quantity of water in motion and the rapidity of

that motion and the suddenness of it, and a whole lot of conditions.

Q. 726. And the degree of the surge or pressure?

A. Just as I have just stated.

Q. 727. And the Cobb device allowed part of the water to pass out through it, did it not?

A. Very little, so far as my observation of its operation went. Some places where I have seen it in use it would stand for months without ever operating at all.

Q. 728. But, assuming there were an extreme and violent increase of pressure in the pipe, it permitted the escape of a certain amount of water from the pipe, did it not?

A. Yes; a small quantity of water would escape from the pipe in case of a serious increase of pressure. One can understand, if he will study that device, that the total quantity of water that can be contained in the air-chamber beneath the air compressed above the same would be a very small quantity in proportion to the quantity flowing in the pipe-line, having sufficient capacity to warrant the application of such a device at all. The consequence was that in operation the actual quantity of water discharged for any particular ram was only that volume which was required to fill the air-chamber to such an extent that the volume of air in the air-chamber was compressed to that pressure which overcame for the instant the increase in pressure caused by the ram in the penstock or pipe-line.

Q. 729. But the air-chambers referred to in both these plants did not permit the discharge through them of any water, did they?

A. The original air-chamber of 1896 on the Grass Valley plant did not provide for the escape of any water from the air-chamber, and the air-chamber on the Bakersfield plant was never, to my knowledge, provided with an automatic air escape.

Q. 730. Therefore, the Cobb device, in so far as it permitted the discharge of a certain amount of water from the pipe-line, nullified to that extent, proportionate to the amount of that water, rebound in the pipe-line?

A. It did not act on that idea at all. It nullified rebound in the pipe-line because there was no pressure acting on the water to cause rebound.

Q. 731. Did it not leave pressure by the outward passage of that certain amount of water?

A. It did not.

Q. 732. Then the action of this device was not to relieve pressure proportionate to the escape of a certain amount of water permitted by it?

A. The action was just as I stated in the second or third answer heretofore. It acted exactly that way under every condition that I ever saw it operate.

Q. 733. But I will have to ask specifically on that one point, in order that your testimony may appear to me to be complete, whether or not the discharge of a certain amount of water through the Cobb device did not, to a certain extent, relieve pressure in the pipe-line?

A. No; it did not, as I understand it.

Q. 734. Had this water taken up and disposed of by the Cobb pressure device been surged back into the line under rebound action of the water-column, as in the air-chamber, a pressure reaction in the pipe-line would have occurred, would it not?

A. Yes; and the pressure at the instant of this rebound would have gone below the normal. That is to say, it would have gone below the normal pressure of the pipe-line due to the return velocity in the pipe-line, and then the flow would change to its correct direction and produce another increase in pressure in the pipe-line above normal.

Q. 735. Now, the escape of this certain quantity of water modified these conditions, did it not?

A. The closing of the valve in the device prevented the first reaction on the water-column.

Q. 736. And there was nothing acting in this way in the operation of the air-chamber, was there?

A. The air-chamber did not act to return the water into the penstock; but the air-chamber acted only to receive on an elastic cushion the first increase in pressure that occurred in the pipe-line.

Q. 737. And there was a reaction or rebound in the use of the air-chamber which was not present in the use of the Cobb device? Is that not correct?

A. Yes, sir. There would be a rebounding action in the penstock that did not have the Cobb device, and under certain conditions where the initial pressure was heavy enough the pressure would drop below the normal pressure of the pipe-line. All of this in connection with penstocks that did not have the Cobb device attached to them.

Q. 738. Then the succeeding action when the pressure dropped below normal would be what?

A. A return of the water, as I have previously stated, to the pipe-line, to a direction of flow normal and in

such a manner as to cause a rise of pressure in the pipe-line, but nowhere near as high a rate of pressure as the first one I considered.

Q. 739. But still a rise of pressure above normal?

A. The rise of pressure in the second one depended on a number of things: first, the intensity of the first rise of pressure and the amount of friction encountered in the reverse flow and following the direct flow.

Q. 740. But the second pressure rise would be above normal, would it not, if the first disturbance was sufficiently severe?

A. Yes, sir; you could always make the first disturbance sufficiently severe to make the second disturbance above normal. That was not always so in practice, but it could be done. It was possible to do it.

Q. 741. Therefore, do you not consider that the Cobb Pressure-Regulating Device offered a kind of protection to the penstock which was not offered by the air-chamber?

A. Most certainly it did.

Q. 742. Now, the pressure chamber device was on the pipe-line of the North Star plant when the pipe-line burst and tore to pieces the concrete viaduct which supported the pipe-line near the power-house?

A. The pipe-line never burst to my knowledge at all. What happened in connection with the concrete viaduct was this: that the pipe-line very carelessly was inclosed in a concrete viaduct while it was empty of water, and, of course, when it was filled with water it changed its shape. Practically, it was a circular pipe. All such pipes are circular. But when they contain a

very high pressure of water they will take as absolutely circular a form as the stiffness of the material of which they are made will allow, and that caused a crack to run along on the top of the concrete inclosing the pipe-line, as I previously stated in testimony heretofore. But this crack was augmented in size and grew from day to day by reason of the ram action which took place in this particular pipe-line, as I have testified many times heretofore, because of the fact that so many different power plants were taking water from it and shutting off the same suddenly, sometimes two or three of them at the same time and sometimes only one, and it kept the pressure in this particular line jumping far more than I ever had seen it in any of my other experiences. It was this combined action of the pipe taking its circular form and the excessive tension brought to expand the size of the pipe-line by these rams, which caused the bursting of the concrete in the inclosure of the pipe-line across the viaduct. The pipe never burst. You won't find it stated that way, because it never did burst that I know of. I will make that clear: when the water was first allowed to flow into this long pipe-line, it flowed in slowly. It took a number of hours to fill the pipe-line, so as not to have any air pockets in it to produce any shock on the line. Consequently, the pipe filled out, as I have previously tried to explain, to its size and shape, due to that static uniform and non-fluctuating pressure. When it did that, in taking its shape and in fitting itself to withstand the strain, it produced the first crack mentioned in the concrete. Then when the pipe line was put into use by all the parties drawing water therefrom, and

it became subjected to still increased pressures due to the ram previously mentioned, naturally it increased in size to some extent under the same law previously hinted at, and caused the crack in the concrete surrounding the pipe-line to increase in size. Another thing that contributed to the increase in size of this crack from day to day was the fact that when the crack takes place, the pulverized material from the crack would drop down in the bottom of the viaduct and sift around the pipe-line so that the next time the pipe-line breathed or pulsated, it acted as a wedge to still further increase the crack in the concrete.

Q. 743. Was that accident to this viaduct one of the causes which led to the installation of the Cobb pressure-regulating device at the North Star plant in 1898?

A. It was known to that extent. But in the meantime the concrete had become so far expanded as to leave a clear hole for the pipe to work in inside of the concrete, and the top of the crack had been plastered over so that no water or dirt would get into it, and at the time the '98 plant was put in that crack was out of any particular consideration. But the experience there and my knowledge of what took place in 1896, no doubt caused me to design the device that I did design.

Q. 744. Namely, the "Cobb Pressure Device"?

A. Yes. And, upon my telling the owners of the North Star mines its probable operation and what a nice thing it would be to help regulate the pressure in the penstock, and thus helping to regulate the wheel, they, being progressive men and always ready to take hold of anything they thought was good in producing

results, told me to put one on. But just when they told me that, I do not know; I do not recall. Our business was done largely in a conversational way, and probably I was told to do that the first time I mentioned the device to the managing owner.

Q. 745. If this Cobb pressure-regulating device afforded more safety to the pipe-line, why did you not advocate the installation of one of these Cobb pressure-regulating devices at the plant of the Power Development Company?

A. The claim never was made for the Cobb regulating device that it offered more safety to a pipe-line than an air-chamber. I consider an air-chamber in a pipe-line one of the greatest elements of safety that can be put on it, because its expense of putting on is so slight in proportion to the cost of the whole installation of the pipe-line. But the object of the Cobb safety device was to prevent fluctuations of pressure in the pipe-line. I wanted to catch the first pressure that came, which I had no means of stopping or controlling in any manner whatever. I wanted to catch the first increase of pressure that came that caused the compression of air, and prevent that air from kicking the water back up the pipe-line again, and in that way I could stop the fluctuations or pulsations in the pipe-line from occurring that up to that time had occurred in such installations. That was the gist of the whole thing, for I only wanted to protect the pipe-line from a sudden blow or ram. The air-chamber is just as good without the Cobb device, because it does receive an increase of pressure on an elastic cushion, and there is nothing about the Cobb de-

vice that for a sudden ram would do anything different from that.

Q. 746. Then what did the Cobb pressure-regulating device better protect, if not the pipe-line?

A. It prevented to a large degree the fluctuations of pressure in the pipe-line, due to intermittent use of water from the pipe-line.

Q. 747. And in that way assisted what particular feature of the installation?

A. At Grass Valley it assisted in bringing about uniform speed of the water-wheel.

Q. 748. And prevented the interference with the governing mechanism which the elastic action or chamber might cause?

A. No; I won't say it that way. It increased the efficiency of the governing-action, because it prevented fluctuation of pressure in the penstock. If there had been no fluctuation of pressure in the penstock there would have been no object in adding the Cobb device.

Q. 749. Why would not the Cobb device have been an assistance to the installation of the Power Development Company?

A. Because they had nobody there causing any fluctuations in the penstock. There was nobody else using water out of the penstock.

Q. 750. But still you made an air-chamber on that?

A. Yes, sir; because we were afraid, as I previously testified to stuff coming down and suddenly blocking up one or more of the water-wheel nozzles, which could thus have had no action on the governing mechanism.

Q. 751. But still might have caused fluctuations on the pipe-line?

A. No, sir; if these particles had come down and stuffed the nozzles, they would have caused a ram in the pipe-line, and to provide that ram, if it occurred, with an elastic cushion, the air-chamber was installed.

Q. 752. That elastic cushion would always produce the rebound which you have testified to this morning?

A. It would have if there had been anything come down to block up the nozzle, and not otherwise.

Q. 753. And that rebound would have been modified by the use of the Cobb pressure-regulating device, as you have testified?

A. Well, if there had been any such ram took place at Bakersfield, or if there had been anything on the penstock at Bakersfield to produce fluctuating pressure, then such action as you indicate would have taken place. But there were no such conditions, and there were not likely to be. The only chance of accident of the Bakersfield plant due to increase in pressure would be caused by particles coming down on the pipe-line and plugging the nozzle, as I have heretofore stated, and the increased cost of installing the Cobb device was not considered warranted in that particular installation. In fact, I did not recommend it myself. I did not see any utility for it. That pipe-line had such a clear flow of water at all times that it would look to me like advocating something that was entirely unnecessary, except in case of accident that was never expected to happen, and the air-chamber was provided to take care of that particular kind of an accident.

Q. 754. But, nevertheless, had such an accident occurred and there had been a rebound, due to the action of the water-cushion, the Cobb pressure-regulating device would have served to modify that rebound, had it been installed on the Bakersfield plant penstock?

A. It would have prevented a rebound.

Q. 755. Now, you have stated the water-gate of the Power Development Company plant never became stuck by the action of silt or other content of the water. Is that correct? The gates controlled by the governor?

O. Oh, yes; they became stuck lots of times by sand.

Q. 756. Did they always become stuck when the by-pass valve got stuck?

A. They would get stuck so that we couldn't turn them off—

Q. 757. Did they always get stuck when the by-pass valve got stuck?

A. I couldn't tell about that. Now, come to think of it, I remember one case in particular where three of them were stuck when nothing else about the mechanism was stuck.

Q. 758. When the by-pass valve got stuck and the water-gates were still free, what did you do?

A. We would clean out the by-pass.

Q. 759. And what did you do with the governor during that period?

A. Whenever any part of the mechanism got stuck up with sand, of course the first thing we would do was to close off the main gate in the penstock, which is represented as operated by the hydraulic cylinder at E, I think.

Q. 760. And you had to do this every time the by-pass valve got stuck?

A. That was the only way we had of shutting off the water.

Q. 761. Please tell me if you did do that whenever the by-pass valve got stuck.

A. I think we did. We had no other way of shutting off the water in the mechanism.

Q. 762. And therefore you could not use the wheels while the by-pass was stuck?

A. We couldn't govern them.

Q. 763. And when you shut down the main gate you didn't use them at all?

A. No, sir.

Q. 764. In doing this you had to take down the by-pass valve? That is, disconnect it from the by-pass of the governor which operated it, did you not?

A. It was only necessary to take out one bulb.

Q. 765. But that disconnected it from operative parts of the governor?

A. Yes, sir.

Q. 766. So that during this period of repair you could not use the gates of the water-wheels conjointly with the by-pass anyway, could you, even if you used the gates of the water-wheels alone?

A. Supposing the by-pass valve had been injured so that it could not be used at all. It would have been easy enough to have put in a blind gasket over the case J, containing the by-pass valve and operating the water-wheel, and operate the case of the water-wheels without the by-pass.

Q. 767. And didn't you do that at times?

A. I don't remember that we ever did.

Q. 768. You don't know that they did not?

A. No, no. I don't know that they didn't; they didn't, I am sure, while I was there.

Q. 769. But the customary thing to do was to stop the wheel entirely when you repaired the by-pass?

A. Yes. You see, the only times when I was there when this plant was operating was at a period either before or at the times heretofore introduced in evidence after that time; that is to say, after the test which I reported on in 1897. I never had anything further to do with the designs or installations introduced in this plant. To my memory, I never had anything to do with them. They had become sufficiently acquainted with the plant themselves and other people who tried to improve the plant had a sufficient number of employees, and I presume they intended to take care of the business themselves, and consequently I had nothing more to do with it. I was at the Bakersfield plant at a later date for two or three days when, as I have testified to heretofore, they were connecting the new tunnel through the mountains with the top of the penstock. I religiously kept away from the power-house at that time.

Q. 770. And when was that?

A. I think it was in 1900. It was at the time that I previously mentioned in giving some of my testimony that I designed some automatic gates, if I remember correctly. I went up to look over the ground to make some sketches in connection with the addits from the tunnel, and I designed automatic gates to discharge the

water coming down from the mountain tunnel, that would operate automatically to open when the water had attained a certain depth in the tunnel and to close automatically when the water had gone down to a certain amount. I think that was in 1900. It was after I came down here to Los Angeles.

Q. 771. Now, referring to complainant exhibits, "Photographs E, H, I, J, K" and "Complainant's Exhibit LL", and "Complainant's Exhibit KK", and "Complainant's Exhibit KKK," and "Complainant's Exhibit X," "Complainant's Exhibit W" and "Complainant's Exhibit ZZ", please state, assuming that the shaft D-E on "Complainant's Exhibit ZZ" is a water-gate operating shaft, in which of these exhibits, if any, and where, do you find such water-gate-operating shaft portrayed or disclosed?

A. Assuming that D-E on Exhibit ZZ is a water-gate-operating shaft, I find it represented on Exhibit E. On Exhibit E it is represented by D, in my judgment. On Exhibit H it is represented by the shaft HH or LL, which is connected to HH. On Exhibit I it is represented by the shaft LL. On Exhibit K it is not shown. On Exhibit J it is represented by the shaft LL. On Exhibit KKK it is represented by the rock-shaft F. On Exhibit LL it is represented by a shaft which I now mark F. It is not shown in Exhibit W. On Exhibit X it is represented by the shaft 64 in Figure 33. It is the terminal shaft of the governing mechanism and might be considered a water-gate-operating shaft.

Q. 772. Doesn't that shaft in each of the instances mentioned also serve as a driving shaft for the water-wheel?

A. No, sir. It is not connected to the water-wheel as a driving shaft in any capacity.

Q. 773. Wait a minute. I am wrong. Serve as a driving shaft for the water gate?

A. I would like to have you use your driving shaft—this is not called a driving shaft, because a driving shaft indicates to me revolution, and none of these shafts that I have just testified to revolve. They are all rocker-shafts, and the use of the word “driving” only leads me to make an answer which is not looked for.

Q. 774. In the sense, then, that the driving shaft be considered an actuating shaft, does not each of these water-gate-operating shafts where pointed out by you so serve, irrespective of whether it completely rotates or merely oscillates?

A. I believe it does in Exhibit E; the connections being below the floor, I cannot determine. The same in Exhibit H. The same reply as to Exhibit I. The same reply in regard to Exhibit J. There is nothing shown on Exhibit ZZ further than an assumption. On Exhibit KKK it shows the connection to the water-wheel-operating gates, and on Exhibit LL it shows to be connected with the water-wheel-operating gates. On Exhibit X it shows no connection to the water-wheel-operating gates. Nothing shown in Exhibit W.

Q. 775. Now, in certain of these exhibits do you not find another shaft which is in train with the shaft first pointed out? That is, mechanically connected with the same, so that one of them might be deemed the driven shaft and the other the driving or actuating shaft, and, if so, please point out.

A. In Exhibit E such a connection does not clearly show. In Exhibit H the shaft HH appears to me to be connected by the rocker-arm and connecting-rod to the rocker-arm KK, giving motion to the shaft LL. In Exhibit LL shaft X operates by means of the rocker-arm attached thereto, to the connecting-rod to the rocker-arm attached to the opposite end of such connecting rod, to operate the shaft C carrying arms and water-wheel operating gate.

Q. 776. Please specify as to Exhibit J, putting it just as you find it.

A. Exhibit J does not show within its limits any shaft connected to the connecting-rod II, which, through rocker-arm KK, would operate shaft LL.

Q. 777. Do the other parts indicate to you that such shaft is there?

A. They do.

Q. 778. Do you find in any of these exhibits, and, if so, where, a part reversible in its motion adapted to turn the water-gate-operating shaft in either direction?

A. There are lots of controlling features in here which will have an effect to turn the water-wheel-shaft in either direction. Lots of things act to do that. The whole governing mechanism is for that purpose.

Q. 779. Do you find any one part which, in reversible movement, acts as a master to turn the water-gate-operating shaft in either direction?

A. On Exhibit J the revolving part CC; on Exhibit E the revolving part G; on Exhibit H the revolving part CC; on Exhibit ZZ the part marked "speed-sensitive means"; on Exhibit KKK the parts marked C; on Ex-

hibit LL the part marked A, and on Exhibit X the part marked 30, 36 and 87.

Q. 780. Now, this you have testified as being the master part causing the motion under discussion of the water-gate-operating shaft.

A. I did that because before that part moves none of the others will.

Q. 781. Exactly. Now, do you find any part in any of these exhibits, and if so please specify, which is under the domination or control of this master part and sets up the ultimate action, causing the movement of the water-gate-operating shaft in either direction, such final part having movement in reverse directions?

A. Well, the operating part connecting the part just testified to on the several exhibits, and which connect that part to the rock-shaft or operating shaft heretofore testified to.

Q. 782. What is the last of this train of parts that has the reversible movement and causes this movement of the water-gate-operating shaft?

A. The power for moving the water-gate-operating shaft, the actual initial power, is derived in Exhibits J, H, ZZ, KKK, LL and X, from the hydraulic cylinder.

Q. 783. And that has a piston in it, has it not, which moves in reverse or opposite directions to cause the turning of the water-gate-operating shaft in either direction?

A. It has a piston that moves back and forth within its limits to operate the water-wheel-gate-operating mechanism.

Q. 784. And that mechanism is operated through

~~through~~ the operation of the water-gate-operating shaft pointed out?

A. In several of these exhibits, as heretofore indicated.

Q. 785. It is wherever you have pointed out that shaft, is it not?

A. Yes.

Q. 786. Do you find in any of said exhibits, and if so where, a controller actuated by the speed-sensitive device or fly-ball pointed out, which is responsive to changes of speed of the water-wheel and which controls such hydraulic cylinder? Now, you will notice that I am asking for the part which is controlled by the fly-balls?

A. The speed-sensitive device in such exhibits as I have indicated as having initial control is shown to have connection with the valve controlling the admission of fluid under pressure to the hydraulic cylinder, said valve being one heretofore referred to as the balanced line-to-line valve, on Exhibit ZZ having its stem marked Y-G, on Exhibit KKK at B, on Exhibit LL at D.

Q. 787. As to the photograph exhibits, what do you find in this respect, and point out as well as you can what you find.

A. In Exhibit J, VV probably refers to the same stem as indicated on Exhibit ZZ by Y-G. On Exhibit K it appears that the parts VV are the same as the parts shown on Exhibit ZZ marked Y-G. Further answering these questions, I wish to state that in these photographs just referred to, the mechanism is not entirely clear, but it appears as I have stated.

Q. 788. Referring to Complainant's Exhibit X, what do you make out the part 52 to be from the table and showing with relation to this part under discussion?

A. 52 in Figure 30 on Exhibit X is called the valve-stem connection. But there is nothing in Figure 30 to indicate that the valve-stem connects to a similar valve to that under discussion.

Q. 789. Referring to Figure 33 of this exhibit, what further, if anything, do you gather?

A. I should make the same reply identically in referring to Figure 33 that I did in referring to Figure 30; that I have no means of knowing just what kind of a valve that connects with.

Q. 790. Does it connect up always with the fly-balls 30-30?

A. It appears to by its alignment in the illustration. The direct connections through cannot be followed in the illustration.

Q. 791. Please point out where, if you so find, in any of these exhibits, you discover a returning-device operating with respect to the part which you have pointed out as being actuated through a stem under the actuation of the speed-sensitive fly-balls, which in turn are operated in accordance with or responsive to changes of speed of the water-wheel?

A. Referring particularly to the exhibits immediately under discussion, the mechanism shown in Exhibit W is intended to operate as what you are pleased to call a returning-device.

Q. 792. How about the other exhibits, and I use the term "returning-device" because it has been used pre-

viously by yourself, both in direct examination and in cross-examination.

A. From the similarity between Exhibit W and the parts shown by YY in Exhibit J, and the parts shown by M in Exhibit E, the parts shown by YY in Exhibit K, the part marked “automatically controlled returning-dashpot” in Exhibit ZZ, the part marked by the letters G-E in Exhibit KKK, the mechanism inclosed within the representation marked E on Exhibit LL—correspond with one another in their general construction.

Q. 793. And conform to the definition that I gave in my last question?

A. The parts just testified to operate to return the balanced line-to-line valve in such exhibits as that valve is shown, to a position from which it had just been moved by the action of the speed-sensitive element.

Q. 794. How about Exhibit X?

A. In Exhibit X in Figure 30 the part marked 43 indicates the general part as conforming, so far as the illustration is concerned, with Exhibit W.

Q. 795. And the part marked “dashpot” in Exhibit K also corresponds with the returning-device?

A. It is one of the elements of the part that acts, as I have just previously testified to, to return the balanced line-to-line valve to a position from which it had just been moved by the action of the speed-sensitive element.

Q. 796. The action of this returning-device is the same as the action you testified about with respect to the returning-device discussed in connection with some of these same exhibits in your answers to questions 720

to 722, inclusive, on pages 724 and 725 of the record? Is that not correct?

A. The questions and answers referred to in your question were discussing the same mechanism concerning which I have just testified.

Q. 797. And are equally applicable in the present instance to these parts you have discussed in these exhibits as involving the operation of the returning device, are they not?

A. The same design of mechanism shown on Exhibit ZZ, KKK and LL; but further than that, I cannot say that the photographs are exactly the same construction, though such photographs as have been referred to indicate that they are the same construction.

Q. 798. And these returning-device features have the same construction and the same mode of operation and the same operative effect as set forth by you in your answers to questions 713 to 722, inclusive? Is that not correct?

A. The operation of the returning features as indicated in the questions referred to, and the answers referred to as there stated, and also to prevent the piston of the hydraulic cylinder from moving too far in any direction when the line-to-line balanced valve has been moved by an initial movement due to the operation of the fly-ball governor CC referred to. The object of all these returning devices is the same—that is, to prevent the piston in the hydraulic cylinder from traveling too far in any direction in which it has started to travel by the action of the fly-ball governor mechanism CC.

Q. 799. And likewise prevents "overrunning," does it not?

A. The motion that might be given to the piston of the hydraulic cylinder in excess of what is required is called "overrunning."

Q. 800. And that is prevented by the operation of this returning device?

A. It would be prevented by the operation of any returning-device that might be installed, so long as it returns the balanced valve to its initial position.

Q. 801. And likewise prevents it from traveling past that proper position, does it not?

A. Yes. All returning-devices act that way.

Q. 802. And that is the action of this returning-device you have discussed, as you understand it?

A. It is the action of all the returning devices discussed during the discussion here.

Q. 803. Now, can you answer my question, to avoid further questions, yes or no, in which I referred to your previous testimony including answers to questions 713 to 722, inclusive?

A. Yes.

Q. 804. The part that you have referred to in your previous question as a cam which enters into the operation of the dashpot of the returning-device, however, introduces a variable rate in the motion of the dashpot and rack connected therewith which is not obtainable in the action of the dashpot in the returning-device of the Complainant's Exhibit Z? Is that not correct?

A. I think that is correct, although I must say, as well, that that only appears to control one side of the

piston of the dashpot. But it will produce a variable result just the same.

Q. 805. No matter which way the dashpot moves?

A. Yes. It would not be alike in both directions, though.

Q. 806. In what respect will it differ?

A. I think it would differ due to the fact that, referring to Exhibit ZZ, if the piston of the dashpot were suddenly moved to the left it would meet with solid resistance of the liquor contained therein trying to pass through under the adjustable valve. But if the piston in the dashpot were moved suddenly to the right, it would meet with an elastic resistance because it might under certain conditions form a partial vacuum between itself and the adjustable valve referred to.

Q. 807. And that would depend upon the arrangement of the adjustable valve and the arrangement of the ports and the amount of liquid in the dashpot, would it not?

A. No; I don't think that, particularly. It would depend on the suddenness with which the initial motion was given—the suddenness and the extent of the initial motion.

Q. 808. And if the dashpot were completely full of liquid it would not make much difference?

A. That would not make any difference. The dashpot is full of liquid all the time.

Q. 809. I mean if the whole circuit of liquid were closely confined, both under and above the cylinder in which the piston of the dashpot acts, so that there were no chance for this liquid content to oscillate, that would make a difference, would it not?

A. The only condition which could be introduced to prevent the liability of the formation of the vacuum which I have just referred to, is, that the whole mechanism containing liquid shall be absolutely and solidly full of liquid without any air space whatever.

Q. 810. That is what I am assuming. Now, going further, no matter which way the dashpot moves in this returning device, there will be a variable rate of its travel, nevertheless, will there not?

A. Yes; there will be—I must not say a variable rate, because that is not true—but it will return to its normal position at a uniformly decreasing rate.

Q. 811. Now, referring to this hydraulic cylinder in these several exhibits before us, which governs the final impulse to the water-gate-operating shaft as far as the reversal of movement of the water-gate-operating shaft is concerned, are the same results not obtained as are obtained by the use of the reversing-clutch, including the gears 9, 10 and 11 of the Lyndon patent in suit?

A. The clutches 9, 10 and 11 referred to, are designed to give opposite motion to the water-wheel operating gates by revolution of the shaft 20.

Q. 812. And the same ultimate effect takes place through the action of this hydraulic cylinder that takes place through the action of this reversing-clutch-gear of the Lyndon patent? Is that not correct?

A. The object of the hydraulic cylinder is to give motion that may be required to the water-wheel-operating gates in the exhibits.

Q. 813. Well, is not the same motion obtained, as far as reversing the motion of the water-gate-operating shaft is concerned?

A. The hydraulic cylinder will operate the gates in either direction.

Q. 814. And that is what is done by the reversing-clutch-gear, referred to in the Lyndon patent? Is that not so?

A. As far as the description set forth, it seems to be true.

Q. 815. And as far as the drawings show, it is true?

A. The drawings do not go fully into the details, and I have got to go by the description.

Q. 816. But taking the drawings and the description together, that is correct, isn't it?

A. Yes.

Q. 817. Now, as to claims 6 and 7 of the Lyndon patent in suit which I have observed, you did not discuss in comparing the claims of the patent with complainant's exhibits photographs, and considering the structures as structures, stated by those claims, will you please point out with respect to complainant's exhibits "Photographs E to L" inclusive, and complainant's exhibit "KKK" and "LL", in which of these exhibits, if any, you fail to find the structures stated by those claims.

A. Referring to the claim 6 of the Lyndon patent, I find the parts in combination as expressed by this claim on exhibits KKK and LL.

Q. 818. And how with respect to the photographic exhibits mentioned?

A. While I may assume that they are there, I cannot indicate them properly because I have no personal knowledge of just what the parts are that are too heavily

shaded to determine. Some of the parts I recognize on the photograph, but not all of them.

Q. 819. Does not the showing of the photographs indicate to you, from your knowledge of such kinds of apparatus, that this general combination of parts is there present?

A. It indicates that, but I did not point them out in my answer because I could not carry the connection clear through. My judgment is, from an inspection of these photographs, that the parts intended to be represented by the photograph are approximately as indicated on Exhibit LL or KKK.

Q. 820. Now, please similarly treat of these same exhibits with respect to the structure or combination of features stated in claim 7 of the Lyndon patent in suit.

A. I will make the same answer as to the previous question.

Q. 821. Without taking into consideration the differences you have made in discussing whether two things must be substantially the same and operating substantially the same way to produce substantially the same results to be mechanically equivalent, and not letting any such discussion enter into the consideration of the question which I am now putting, do you find any substantial differences in the general governing results obtained between the general disclosures of the Lyndon patent in suit and the disclosures of these exhibits E to L, inclusive, KKK and LL, now before us?

A. The object of the devices shown in both cases is the same, and if one device were as practical in its construction as the other, the results would be substantially

similar, the same as we may say that an automobile driven by a steam engine and one driven by a gasoline engine produce the same result.

Edw S Cable recalled

CROSS-EXAMINATION (Resumed).

April 15, 1914. P. M. *by Mr Blahutsky*

Q. 822. Are you able to point out any features of the governing action which the dynamo and solenoid 33 and its core 34 of the Lyndon patent in suit can do that the fly-ball and line-to-line valve mechanism of the several complainant's exhibits photographs E to L, inclusive, and of complainant's exhibits ZZ, KKK and LL, blueprints, cannot do?

A. As I have heretofore testified, anything in the Lyndon patent concerning electrical features and electrical action, I have to take for granted as stated in the patent, and not from any knowledge of my own concerning the probable action of such elements, and the dynamo 8 shown in the Lyndon patent is assumed to vary certain electric currents out of proportion to any changes of speed, and the solenoid is assumed to work all right without regard much to the quantity of current passing through them, and assuming that all those electrical connections are as they are theoretically set up in the specifications, the object of the operation of all the parts named was to produce a speed-sensitive device similar in its resultant control of the water-wheel gates to the devices set out in the exhibits mentioned. Their method and means of producing these results is entirely different in the two cases.

Q. 823. The slow return of the by-pass valve to nor-

mal position which you have just discussed in speaking of claim 7 of the Lyndon patent in suit, in comparing the same with several of the exhibits, will prevent any sudden change of pressure in the penstock, will it not, due to such action of the by-pass valve?

A. I never have had an opportunity to experiment with the by-pass valves operated in that manner, but my idea would be that that would be the result of the operation of the mechanism shown, and would be to prevent sudden and excessive changes of pressure. But I have never had a chance to experiment with them myself under those constructions.

Mr. Blakeslee: That is all.

REDIRECT EXAMINATION.

By Mr. Westall:

Q. 824. Referring to defendant's exhibit "Lamb Patent", would it make any difference, in your opinion, if all the nozzles No. 6 were dispensed with and only the retarding nozzle and the one opposite thereto were used?

Mr. Blakeslee: Objected to as indefinite. To what extent is the word "difference" to be understood, and in what capacity?

Q. 825. By Mr. Westall: In any difference in the essence of that invention?

A. It wouldn't make any difference in my judgment.

Q. 826. State whether or not any difference in the relative size or proportions of the nozzles remaining after dispensing with nozzles 6 would alter the principle or essence of the Lamb invention?

A. It would not alter the essence of the invention at all, but in practice it would be necessary to have such relative size that nozzle 7 would supply sufficient water for the load and that the retarding nozzle 8 should have sufficient retarding motion to control the speed. That would be all the difference.

Q. 827. And do you believe that such relative size or arrangement would in any way affect the disclosure of the Lamb patent as to the essence or principle involved therein?

Mr. Blakeslee: Objected to as calling for a conclusion, and the patent speaks for itself as to these parts and their participation in the general mode and scheme of operation.

A. No, sir; it don't make any difference.

Q. 828. By Mr. Westall: Now, there have been several kinds of valves spoken of: butterfly valves, and gridiron valves, as well as the peculiar kind in use on the Bakersfield plant, the technical name of which I have forgotten. State whether or not those different kinds of valves were known and used in the water-wheel-governing art prior to the date of the Bakersfield installation in 1896 and 1897?

A. To my certain knowledge a butterfly valve had been used to regulate speed; to my certain knowledge the line-to-line balanced valve had been used to regulate speed; and the valve you refer to at the Bakersfield plant, the by-pass valve, that was nothing but an adaptation of the common plug cock, and the gridiron valve is as old as the steam engine.

Q. 829. Then, if I understand you correctly, to sub-

stitute one valve or one form of valve for another, would not be outside of the ordinary skill of an engineer who knew his business, wherever the demands or conditions of the particular installation seem to so require?

A. I think that an engineer would take that form of valve which he thought would fill the conditions best or which he could operate the handiest. That means the same thing. He would take the one which answered his purpose better than any others. That would be my judgment.

Q. 830. There was nothing broadly new or in any sense novel in the use of a butterfly valve to control the by-pass or the main water-gate?

A. Not at all new in any sense, either because it was a butterfly or because of its location.

Q. 831. Now, it would be possible, would it not, for the gates and by-pass valve and main gate of the Lyndon patent to become clogged and inoperative by the deposit of sand or pieces of wood or other things that might be allowed to get into the pipe-line?

A. Of course, I don't understand what kind of valves or water-wheel-operating gates were in contemplation by Lyndon. But butterfly valves, as a class, clog up with foreign material less than most other forms of valves. It depends on what kind of foreign matter is in the water. If it is long and stringy like hay or roots, they clog up faster than a plug cock or gridiron valve. But for light sand and floating sand like mica schist, they do not plug up so easy as some other valves would.

Q. 832. In testifying regarding the Swiss patent, I notice that you confined yourself mostly to the drawings

of that patent. Please state whether or not you were able to fully explain the operations of that device by reference to the drawing in connection with your previous reading of the translations.

A. Yes, sir; that was my idea. There is no difficulty for me to understand the operation of the Swiss patent in looking at the drawings and reading the specifications. I confined myself to the drawings when I was testifying simply because they were handy for me and I was not sufficiently acquainted with the language used in the specifications to quote it.

Q. 833. Either counsel or yourself in answering some question used the word "hazy" in regard to some detail of the Swiss drawing.

A. I think that might have been myself, the first time that I had them presented for discussion; because at that time I had only been over the translation once, several days prior, and I had forgotten partially just the function of some small valve which occurred to me later on, and I think I corrected myself in that heretofore.

Q. 834. In your opinion, if the drawings and translation of the Swiss patent which have been offered in evidence in this case were placed in the hands of one skilled in the art, could such a person construct and build a device according to the disclosures of this patent? What I mean to say, is, the drawings taken in connection with the translation is sufficiently clear to enable an ordinary engineer of ordinary skill to build and apply and use the disclosures of that patent?

A. I think they are plentifully sufficient for that purpose.

Q. 835. Would the use of the word “servomotor” in the translation introduce any ambiguity in the language used?

A. Not to me. But it is a peculiar word. In our custom we do not use that word in this country. But in the translation it was used for the name of that piece of apparatus which was the source of some particular movement as the result of energy applied to it, like, for instance, a cylinder with liquid under pressure in it to move a piston, was a servomotor. And, as I remember, one time in the specification he refers to the fly-ball governor mechanism as being a servomotor because it supplied the motive force for moving a certain lever and valve. But I think in connection with the drawing that there is no need of one being mystified as to what was meant by the word “servomotor”.

Q. 836. You believe that would be true with anyone skilled in the art, reading the drawing and the entire translation?

A. The drawings and the translation, particularly the drawings, would render it possible for a man to build a water-wheel that would operate all right under that patent. There is no doubt in my mind about that at all.

Q. 837. Now, in regard to the French patent, do you consider the drawings, taken in connection with the translation which has been furnished, sufficient to enable one skilled in the art to use and put in practice the invention or device shown and disclosed in that patent?

A. Well, so far as shown by the drawings of the French patent, of course, the relative sizes of the parts, which is not, I understand, material in the patent,—but

as a matter of fact in this case the relative size of the parts to make a complete machine are not nearly as fully and nicely set out as in the Swiss patent, but the drawings are sufficient to show the principles of operation clearly and properly, and the question of size of parts would be entirely left to the designer, as it is in most of these patent drawings. It is not necessary to make a scale of the drawing of the patent correspond to the scale of a drawing for constructing the working parts.

Q. 838. So that if you were to place the translation and the drawings of the French patent in the hands of an ordinary engineer with directions to install that kind of an apparatus in connection with some water-wheel, do you believe that he would have sufficient information before him to build and install a device in substantial accordance with the terms and description referred to?

A. I believe an engineer or draughtsman competent to design a water-wheel mechanism at all, would be competent to design one under the disclosures of the French patent, using for his primary information the disclosures of said French patent and drawings.

Q. 939. Now, in reference to the Bakersfield installation, you testified that Knight & Tuthill wheels were put in instead of the Girard wheels. You do not wish it understood, do you, that any change was made in the governing means?

A. I don't know anything about that, but I always understood that the governing mechanism never was changed when those wheels were installed. I was not present when they were installed.

Mr. Blakeslee: We ask that all that portion of the an-

swer commencing with "But I always understood—" be stricken out as not responsive to the question, and being manifestly hearsay, as the witness stated previously that he didn't know anything about it.

Q. 840. By Mr. Westall: Now, beginning with question 703 of the cross-examination, and that portion of your testimony immediately following, particularly question 706, where after you had pointed out certain operating means you were asked in question 706: "Any controller for it, responsive to changes of speed of the water-wheel." Is it not a fact that shortly before that question was asked, or at the time of asking that question, that you first mentioned parts marked on some of the exhibits as "returning dashpot for the controller", and then off the record you asked the attorney for complainant what he meant by "controller", and he said he meant the hydraulic cylinder, whereupon, in answering that question regarding such speed control as shown on Exhibit H, etc., you simply accepted complainant's term "controller" without giving any particular attention to the strict applicability of the term to the parts pointed out, or without any particular comparison of the wording of the patent in suit?

Mr. Blakeslee: Objected to as assuming matters not in the record and testimony not given by the witness, and it is not thought proper to try to interject into the record anything which qualifies anything in the record which was brought into the record without objection and in direct answer to questions, and as not proper rebuttal examination.

A. I remember the general incident that you refer

to. When I was going over those exhibits and pointing out the different controls therein shown, I didn't pay so much attention to the exact language in which the questions were asked as I thought I understood the part referred to. Now, as a matter of fact, from my point of view in the exhibits shown here there are a great number of pieces that are controllers each acting to assist the other in a way. For instance, the fly-ball governor in Exhibit KKK is a controller in that it operates to control the position of a certain balanced valve. Then the balanced valve becomes a controller because it determines the position of a certain piston in the hydraulic cylinder. Then the hydraulic cylinder becomes a controller to move other parts. That is the way any of those pieces become a controller, or, to call them by their real names, a hydraulic cylinder or balanced valve or speed governor. That was my notion in discussing the subject, and I didn't pay any particular attention to whether you called it a "fly-ball governor" or a "speed-controller". That is as far as those answers were made. To me all those things are controllers.

Q. 841. By Mr. Westall: So that in the use of any of those terms suggested by complainant's counsel as properly applicable to the parts, you did not mean to imply that there was any similarity of function between those parts which are called by the same name in the Lyndon patent, did you?

Mr. Blakeslee: Objected to as leading and as cross-examination of defendant's own witness, and not redirect examination, and as indefinite and assuming testimony not given.

A. When I was testifying in connection with the questions recently quoted, I did not have the Lyndon patent in mind at all. I was not testifying in regard to the Lyndon patent. I do not recognize the parts as being in any way similar to those shown in the Lyndon patent.

Q. 842. By Mr. Westall: Now, if I understand you correctly, you did not, by the use of such terms, wish to qualify in any way your testimony given on direct examination to the equivalence of such devices as the solenoid 33 of the Lyndon patent—you did not wish to be understood by the use of such terms as implying that the part called “control” in the Lyndon patent is in any way similar to that pointed out in the exhibit?

Mr. Blakeslee: Objected to as leading and not cross-examination, and as having only one effect, namely, to coach the witness.

A. In no way whatever.

Mr. Westall: I believe that is all.

RECROSS-EXAMINATION.

By Mr. Blakeslee:

Q. 843. You fully understood my questions, did you not, when I was asking you to point out in the several exhibits, features capable of doing certain things, such as controllers, speed-sensitive devices and returning devices, irrespective of whether I was talking about the Lyndon patent or anything else as having those features unless I specified the Lyndon patent or something else?

A. When you were asking me those questions in reference to the exhibits that we had under discussion, I understood exactly the parts that you referred to.

Mr. Blakeslee: That is all.

Mr. Westall: I ask that an adjournment be taken until Tuesday, the 21st of April.

Mr. Blakeslee: We cannot definitely consent to any such continuance for the reason that it interferes vitally with plans counsel for complainant has made with respect to several other matters of litigation requiring attention, and which likely will require such attention at that date and immediately following that date. Complainant's counsel assumed that taking of testimony would continue in this case on behalf of the defense, in line with the professions of diligence which counsel for the defendant has made, and has shaped his plans accordingly. If that date can be held open for the purpose of taking defendant's further proof, counsel for complainant will aim to be on hand. But there are matters controlled by movements of individuals beyond the regulation of complainant's counsel, and by dates set by the patent office in certain interference proceedings, beyond the control of counsel, which may interfere with counsel for complainant going on at that time and immediately thereafter. This is as far as counsel for complainant can state at the present time.

(Whereupon, by request of counsel for defendant, the Examiner adjourns the further taking of proofs on behalf of the defendant in this case until Tuesday, April 21, 1914, at this same place, at the hour of 10 o'clock A. M.)

~~July 2nd, 1914 P. M.~~

MICHAEL KVAPISHEVSKI, heretofore sworn and examined, was recalled on behalf of Defendant, and testified as follows:

DIRECT EXAMINATION.

By Mr. Westall:

Q. 21. You have heretofore furnished translations in this case of Defendant's Exhibit French Patent and Defendant's Exhibit Swiss Patent, have you not?

Mr. Blakeslee: We repeat our objections heretofore made with respect to both of these exhibits, on the ground that the objections heretofore registered, including the grounds that the exhibits are not identified, and that one or both of same does not come within the answer of defendant interposed in this case; that these exhibits have not been proven for use in this case. We further object to the questions put to this witness in connection with these exhibits on the ground that the witness is not qualified.

A. Yes, sir.

Q. 22. By Mr. Westall: I now call your attention to certain writings on a drawing accompanying Defendant's Exhibit French Patent, which, at the time of furnishing the translations referred to, was not apparently taken into consideration by you. Will you now please examine the writing referred to on the drawing accompanying the French Patent and furnish a translation thereof, if you understand the language in which it is written and if you are able to do so.

Mr. Blakeslee: Objected to as not the proper method of proof and not the best evidence, no foundation laid for secondary evidence, and on the further repeated objection that the witness is not qualified, and the former objections made are, of course, repeated throughout this inquiry.

A. Referring to the inscription on the upper left hand corner of the drawing accompanying the French Patent, I find the inscription as translated would read: "Drawing adjoined to patent of 15 years taken the 8th of August, 1899, by the machine factory of Escher, Wyss & Company, incorporated. Paris the 9th of February, 1914. General Secretary of the National Office of Industrial property." The signature appears to be "Broan," but not sufficiently legible to be determined.

The inscription on the lower left hand corner reads as follows in translation: "Paris the 8th of August, 1899. By Permission of the machine factory of Escher, Wyss & Company, incorporated." The part first referred to has the red letters in part.

Q. 23. By Mr. Westall: Please examine the impression of the seal partly covering the printed stamp in red.

Mr. Blakeslee: The same objection.

A. The adjoined seal, as far as can be read, shows an impression of the seal of the National Office of Industrial property.

Q. 24. By Mr. Westall: Referring to the seal at the end of the written copy of Defendant's Exhibit French Patent, will you please translate as well as you are able to make out the words of that impression of the seal?

Mr. Blakeslee: The same objection.

A. As far as I can make out, the impression of the adjoined seal reads: "National Office of Industrial Property", and on the right hand side of the margin I find the words, "Fine Arts and Trades."

Mr. Blakeslee: We repeat our objections, even in

~~view of the testimony just taken, which have heretofore been urged with respect to the want of identification of this exhibit, no proof having been adduced as to the authenticity of the purported patent copy or the purported authentication thereof by any consular officer or other official empowered and required to authenticate documents from a source foreign to the United States and its territory.~~

Mr. Westall: This closes the defendant's case.

~~April 23, 1914. A. M.~~

PETER H. DUCKER, called and sworn as a witness on behalf of defendant, testified as follows:

DIRECT EXAMINATION.

By Mr. Westall:

Q. 1. What is your business, Mr. Ducker?

A. I am record clerk of the Southern California Edison Company.

Q. 2. How long have you held that position?

A. Four years.

Q. 3. As record clerk do you have charge and custody of the library of the Southern California Edison Company?

A. ~~Yes.~~ *I am*

Q. 4. You are here in response to a subpoena *duces tecum*, are you not, to produce certain books?

A. Yes.

Q. 5. Have you produced those volumes?

A. I have produced the volumes that were asked for, and the years that were asked for in the subpoena.

Q. 6. Are these the volumes that you have produced in response to the subpoena?

A. They are.

(The witness identifies and points out two bound volumes each marked "Journal of Electricity" on the back, one being marked "Vol. 2 Jan-Dec, 1896" the other being marked "Vol. 4-5, April-June, 1897-98.")

Q. 7. Where did you get the volumes that you have identified?

A. They are current issues of that time, which were bound for our library purposes.

Q. 8. From the sheets of what?

A. The Journal of Electricity.

Q. 9. Has the name been changed since those books were published?

A. Yes; the name now is Journal of Electricity, Power and Gas.

Mr. Blakeslee: Note to the last question that it is objected to as not the best evidence, the witness not having qualified.

Q. 10. By Mr. Westall: Where was it published?

A. San Francisco.

Q. 11. How long have you been employed with the Southern California Edison Company as librarian?

A. Four years. Can I ask a question that has nothing to do with this? Am I supposed to be subpoenaed by George Henry or by the city of Los Angeles?

Mr. Westall: By the city of Los Angeles.

Q. 12. Does the Southern California Edison Company still take the Journal of Electricity, Power and Gas, subsequent to the numbers of this periodical?

A. It does.

Q. 13. I notice that some of the articles which we have set up in the proposed amendment to the answer are not produced, being probably contained in Vol. 3 of the Journal of Electricity. Have you that Vol. 3 of the Journal of Electricity?

Mr. Blakeslee: Objected to as leading.

A. We have.

Q. 14. By Mr. Westall: Will you please as soon as convenient after this hearing produce that Vol. 3?

A. I will.

Mr. Westall: Counsel for defendant offers in evidence the two bound periodicals pointed out and identified by the witness, being Vol. 2, 4 and 5, of the Journal of Electricity, purporting to be published as follows: Vol. 2 purporting to be published from January to December, 1896; and Vols. 4-5 from April to June, 1897-98. And we request that the same be received in evidence and marked in some way so as not to deface the books, as defendant's exhibits "Journals of Electricity, Vol. 2" and defendant's exhibit "Vols. 4-5, Journals of Electricity."

Mr. Blakeslee: Objected to on each and every one of the grounds heretofore urged to the offer of any evidence not within the pleadings in this case, and not based upon the answer, these exhibits not being predicted upon any defense set up in the answer in this case, and on the further ground that they are irrelevant, incompetent and immaterial, and on the further ground that the witness has not qualified as to the introduction of these exhibits and that they are not identified, and it is further to be noted that these purported exhibits do

not conform to the attempted amendments to be made in accordance with the papers on motion to amend the answer in this case.

(The said Exhibits are marked as follows:

“Defendant’s Exhibit Journal of Electricity, Vol. 2.” Together with the title of the court and cause and the date upon which the same was offered; and

“Defendant’s Exhibit Journal of Electricity, Vols. 4-5”, together with the title of the court and cause and the date upon which the said exhibit was offered.)

Q. 15. By Mr. Westall: Who is the owner of these books that you have produced?

A. The Southern California Edison Company.

Q. 16. During the time of your employment as librarian there have they been under the control and custody of the Southern California Edison Company.

A. They have.

Q. 17. Were you authorized by the Southern California Edison Company in response to the subpoena served upon that company to produce these books as an agent of the company?

A. I was.

Mr. Westall: That is all.

CROSS-EXAMINATION:

By Mr. Blakeslee:

Q. 18. How long have you been with the Southern California Edison Company?

A. Since April, 1906.

Q. 19. Do you know when these two volumes were received by the Southern California Edison Company?

A. At the time they were received I did not have charge of these books, so I cannot give direct or positive information as to when they were received.

Q. 20. You were not with that company when these volumes were received?

A. I do not know which ones they were; it was in 1906 and '07.

Q. 21. I notice part of these are dated back to 1896 and 1897.

A. Oh, '96 and '97? No; I was not with them at that time.

Q. 22. Then you have no actual knowledge of the receipt by the Southern California Edison Company of these volumes?

A. No.

Q. 23. You state when you became connected with the company these volumes were turned over to you?

A. No, sir.

Q. 24. When did you first see them?

A. I first saw them at various times during my work as an engineer with the

897

insert line 30 "Mr. Blakeslee: In view of the answers of the witness on cross-examination, we repeat our previous objections to the offer of these volumes, and particularly on the ground that they are not identified and that the witness is not qualified to identify or present the same. San Francisco, Cal., Apr. 28, 1914, 2 P. M."

company of these volumes? Is that correct?

A. I did not.

Mr. Blakeslee: That is all.

San Francisco, April 28, 1914 P. M.

not conform to the attempted amendments to be made in accordance with the papers on motion to amend the answer in this case.

(The said Exhibits are marked as follows:

“Defendant’s Exhibit Journal of Electricity, Vol. 2.” Together with the title of the court and cause and the date upon which the same was offered; and

“Defendant’s Exhibit Journal of Electricity, Vols. 4-5”, together with the title of the court and cause and the date upon which the said exhibit was offered.)

Q. 15. By Mr. Westall: Who is the owner of these books that you have produced?

A. The Southern California Edison Company.

Q. 16. During the time of your employment as librarian there have they been under the control and custody of the Southern California Edison Company.

A. They have.

Q. 17. Were you authorized by the Southern California Edison Company in response to the subpoena served upon that company to produce these books as an

California Edison Company?

A. Since April, 1906.

Q. 19. Do you know when these two volumes were received by the Southern California Edison Company?

A. At the time they were received I did not have charge of these books, so I cannot give direct or positive information as to when they were received.

Q. 20. You were not with that company when these volumes were received?

A. I do not know which ones they were; it was in 1906 and '07.

Q. 21. I notice part of these are dated back to 1896 and 1897.

A. Oh, '96 and '97? No; I was not with them at that time.

Q. 22. Then you have no actual knowledge of the receipt by the Southern California Edison Company of these volumes?

A. No.

Q. 23. You state when you became connected with the company these volumes were turned over to you?

A. No, sir.

Q. 24. When did you first see them?

A. I first saw them at various times during my work as an engineer with the company, prior to the time I took charge of the library, which was about four years ago.

Q. 25. And when were you first connected with the company in any capacity?


A. April, 1906.

Q. 26. You had, of course, nothing to do with the receipt, binding or original filing in the library of that company of these volumes? Is that correct?

A. I did not.

Mr. Blakeslee: That is all.

San Francisco, April 28, 1914. P. M.



S. L. BERRY, produced as a witness on behalf of the defendant, being first duly sworn, deposed as follows:

DIRECT EXAMINATION.

By Mr. Westall:

Q. 1. State your name, age, residence and occupation.

A. S. L. Berry; age, forty-four years old; residence, Sunnyvale, Santa Clara County; occupation, mechanical and hydraulic engineer.

Q. 2. What education, training or experience have you had that would tend to qualify you to testify as an expert in a patent case involving a water-wheel governor?

Mr. Blakeslee: Objected to as leading and not the proper method of qualifying a witness.

A. Twenty-seven years experience in designing and constructing machinery, about twenty years of which have involved hydraulic subjects—water-wheels, governors, giants, hydraulic elevators, pipe-lines, etc.

Mr Westall
Q. 3. Have you ever had any experience as an electrical engineer?

A. No.

Q. 4. I now call your attention to complainant's exhibit HH, purporting to be a copy of the Lyndon patent in suit, and ask you to state whether you have read and studied that patent and if you understand the device therein described and disclosed.

A. I have very carefully read and studied the patent in question, and thoroughly understand the mechanism involved.

Q. 5. I will ask you to please describe in a general way the device shown in said Lyndon patent, giving your idea of the object aimed at.

A. The Lyndon patent in a general way shows a water-wheel and by-pass with valve, and the object of this mechanism is to control the speed of the wheel, using a by-pass to maintain constant head in the pipe during the action of the governor. The speed-control mechanism consists of a generator with solenoid and core operating through contacts to energize magnets, drawing into action a reversing-gear mechanism intended to operate the gate in one or the other, depending on whether the speed of the wheel has been increased or decreased. Also soon as this gate-operating shaft starts in action, there is thrown into operation the compensating mechanism working on the by-pass valve. This by-pass valve stands normally in a half-open position, rendering it possible to move it toward closed or opened position, according to whether the wheel-gates are moving toward opened or closed position. The fundamental principle underlying this mechanism is that there is maintained close to the wheel a surplus quantity of water flowing and ready to be diverted to the wheel when called for. Also providing a means by which excess water not called for by the wheel can be quickly discharged through the by-pass valve. The operating means are electrical and mechanical, electrical in the controlling mechanism and mechanical in the application of power to the gate and by-pass movements.

Q. 6. Please state whether or not the devices shown and disclosed in the Lyndon patent, as the same appear

in the drawings thereof, are an operative device. That is to say, in your opinion, will the device produce the results which you have described, in the manner which the patentee evidently had in mind? Please state fully your reasons for any opinions you may express.

Mr. Blakeslee: Objected to as leading and calling for a conclusion on the part of the witness, and not the best evidence. And, further, the witness is not qualified.

A. The mechanism as shown is inoperative and especially inoperative in the return mechanism. This return mechanism comes into action simultaneously with the gate-operating mechanism. There is no time allowed for gate movement, nor any action depending on gate movement. The mechanism shows the return device to be of exceeding quickness in action. There is no rest between the application of the gate-moving device and the operation of the return mechanism. Furthermore, on the operation of this return mechanism the clutch throwing it into action is disconnected, leaving the solenoid 33 free to make the same connection previously made, the result being a vibration of the lever 40 between contact and non-contact. I can see no element properly correlating the action of the return mechanism with the gate movement.

Mr. Blakeslee: In view of the testimony of the witness admitting his non-experience in electrical matters, we ask that all that part of the answer referring to the correlation of features of the Lyndon patent depending on electrical energization be stricken out and withheld from consideration.

A. The question as to electrical engineering was mis-

leading. I am posted on solenoids and cores of that sort.

Mr. Blakeslee: I do not want to attack your qualifications, but I just want to know just where you stand on it.

A. I have had considerable experience in this kind of work.

Q. 7. By Mr. Westall: From your particular study of the devices of the Lyndon patent, as well as your general knowledge of electrical matters, do you understand fully the operation of the device shown in the Lyndon patent?

A. I have a complete knowledge of it from my experience with electrical elevators, which involve the use of similar mechanism—gears, solenoids, etc. The electrical features are very simple in this and can be comprehended by anyone understanding solenoid action.

Q. 8. Please state your conclusion, based upon your previous explanation of the patent, as to whether the device there shown would effectuate the results aimed at by Lyndon.

Mr. Blakeslee: Objected to as indefinite and calling for a conclusion, and not the proper method of proof and not the best evidence.

A. The mechanism shown cannot operate as desired on account of the lack of correlation of the parts necessary to the result.

Q. 9. By Mr. Westall: What have you to say as to the practicability of the device shown and disclosed in the Lyndon patent in suit as a water-wheel governor for the purpose designed?

A. The device shown as a water-wheel governor will

not be operative, for the reasons given, and is extremely complex in its parts.

Q. Prior to the date of the application for the Lyndon patent, namely, September 13, 1900, state whether or not you have ever known of a water-wheel governor employing in aid of the main gate a by-pass, which by-pass was so constructed as to operate inversely to the operation of the water-gate.

Mr. Blakeslee: Objected to as calling for a conclusion, not the proper method of proof, and as leading and suggestive.

A. The by-pass mechanism installed at Bakersfield operated inversely to the main water-gates. As the water-gates opened, the by-pass valve closed in proportion. Inversely as the water-gates closed, the by-pass valve opened in proportion, maintaining a constant flow of water in the pipe, preventing pressure changes, and enabling the governor to work at any speed of which it was capable. In addition to this, the deflecting hood was in use, acting as a by-pass. In this mechanism the water not required on the wheel was diverted past. The Swiss patent is an example of by-pass operating inversely to the main water-gate.

Mr. Westall: I would suggest that we did not—

Mr. Blakeslee: Read the question, please.

Mr. Westall: I had better ask another question.

Mr. Blakeslee: I don't believe that is responsive. I think your question was if he had ever seen such an installation.

Q. 11. By Mr. Westall: You have mentioned a device in use at Bakersfield. Please state more fully when

and where, and under what circumstances that device employing the inverse operation of the by-pass was used.

A. The Bakersfield by-pass valve was used as a vitally necessary part of the governing mechanism of that plant.

Q. 12. I mean the circumstances of when and where it was.

A. The mechanism was designed in 1896 and installed at the plant of the Power Development Company near Bakersfield.

Q. 13. What was the nature of that company? Was it a corporation?

A. I am not acquainted with the circumstances of the company organization.

Q. 14. Can you mention any of the officers or persons connected with the installation?

A. The only officer I am acquainted with was Mr. C. N. Beal, who, I understand, was general manager.

Q. 15. Has your experience been such as to familiarize you with the state of the water-wheel-governing art prior to September 13, 1900, the date of the Lyndon application?

Mr. Blakeslee: Objected to as involving a conclusion, and no foundation laid.

A. I am acquainted with the state of the art in a general way at that time.

Q. 16. By Mr. Westall: Can you tell in a general way and briefly what methods were in use prior to September 13, 1900, for the government of water-wheels?

A. In many plants at that time governors were used operating directly on the water-gates. However, the de-

flecting hood had been put into use, and the deflecting nozzle was used and was an old device at that time. Bypass valves operating inversely to the water-gates have been used on the plant on the American River, and later installed at Bakersfield. There was also at that time a mechanism shown in the Lamb patent cited in this case. Likewise, the Swiss and French patents cited.

Mr. Blakeslee: We ask that that portion of the answer referring to patents be stricken out as not responsive to the question.

Q. 17. By Mr. Westall: Will you describe fully the construction of the deflecting hood governor.

A. The deflecting hood was a mechanism used in connection with a simple nozzle, usually circular in section, for the purpose of diverting from the wheel that portion of the water not required by the load at any particular instant. This hood was moved into the stream and deflected part of the water from the wheel.

Q. 18. Please state what became of the water that was not used in propelling the wheel, with the deflecting hood type of governor.

A. The water in use on the wheel was wasted to the tail-race.

Q. 19. Please compare briefly in a general way the device of that deflecting hood nozzle with the principle shown and disclosed in the Lyndon patent in suit.

Mr. Blakeslee: Objected to as irrelevant, immaterial and incompetent, and not coming within the issues of the pleadings.

Mr. Westall: The question is simply to develop the

state of the art prior to the date of the Lyndon application.

A. The deflecting hood produced the desired result by diverting a portion of the power water from the wheel, and maintained a constant flow in the pipe and wasted the water not used, necessarily. The Lyndon mechanism diverts from the wheel water not called for by the load at a particular instant, and maintains constant flow in the pipe during governor action, and wastes water not used on the wheel.

Q. 20. What similarity or difference, if any, do you find in that method of governing the wheel as compared with the by-pass arrangements of the Lyndon patent in suit?

A. The principal difference is that the deflecting hood operates through the entire range of the wheel capacity. It requires no more water than the full load capacity of the wheel demands. The Lyndon mechanism maintains a constant waste of water, demanding at full wheel load an excess amount of water equal to one-half of the by-pass capacity. The by-pass hood maintains constant flow in the pipe at all times. The Lyndon device solely during governor action.

Q. 21. I now call your attention to the Lyndon specifications, beginning with line 8, page 1, reading: "The governors at present employed to regulate the water supply to the water-wheel in general simply operate to open or close the water-wheel gate, thereby allowing of the admission of a greater or less supply of water." I ask you to state whether or not the language quoted is a correct statement of the condition of the

water-wheel governing art prior to the date of the Lyndon application?

Mr. Blakeslee: Objected to as calling for the conclusion of the witness, not the proper method of proof, and not the best evidence, and also as leading and suggestive.

Q. 22. By Mr. Westall: And in doing so, please state fully your reasons for any opinions you may give.

A. The statement made is incorrect in view of the use at that time of the deflecting hood, deflecting nozzle, the Berry by-pass, the mechanism shown in the Lamb patent, the mechanism shown in the French and Swiss patents cited in this case.

Q. 23. You have referred to several patents. Please state fully, for the sake of the record, which patents you mean.

A. The patents referred to in the last answer are Defendant's Exhibit Lamb Patent, Defendant's Exhibit French Patent, and Defendant's Exhibit Swiss Patent.

Q. 24. I now call your attention to page 4, beginning at line 88, of the specifications of the Lyndon patent in suit, where it is said: "It is here to be noted that all water-wheel governors as made today must accomplish their governing only at such a speed as the acceleration or retardation of the water in the column of the pipe can be accomplished, whereas in the case of the governor hereinbefore described, with the compensation-gate and actuating apparatus, the time element is removed from the main gate and the water-wheel and taken care of in the by-pass." And I ask you to state whether or not the language quoted correctly describes the condition of

the water-wheel-governing art at the time of the Lyndon application, September 13, 1900; and, in doing so, please state fully your reasons for any opinion you may express.

Mr. Blakeslee: The same objection as last noted.

A. The statement made is incorrect in view of the use at that time of the deflecting hood, deflecting nozzle, Berry by-pass, the mechanism shown in the Lamb patent and the Swiss patent and in the French patent cited in this case. In all these mechanisms the governor was free to operate irrespective of pipe-line conditions.

Q. 25. By Mr. Westall: Will you please describe more fully the manner in which the amount of water delivered to the wheel was regulated in the deflecting hood type of nozzle which you have mentioned, explaining the nature of the governor employed?

A. The deflecting hood was devised for use for what is now known as impulse wheels, and it consists of the wheel-centered buckets spaced around the periphery. The water was usually applied through a circular nozzle placed close to the buckets. The deflecting hood was a plate fulcrumed usually below the nozzle and moved by the governor into the stream, diverting a certain portion of the water from the buckets. This mechanism could be operated by any type of governor, depending on speed changes of the wheel. There were no inertia effects to be taken care of, and any governor at that time was able to handle the mechanism.

Q. 26. State whether or not the device which you have mentioned as having been designed in 1896 for use at Bakersfield employed a speed-governor, and, if so, describe it briefly.

Mr. Blakeslee: Objected to as calling for a conclusion as to the function and purpose of such device.

A. The mechanism designed for use at Bakersfield was operated by a governor which responded to load and speed changes. It was in effect a transmitting dynamometer which took a definite position in response to a definite load. This position was modified slightly by any speed variation which occurred. The by-pass valve was an extremely necessary part of the equipment, inas much as the rapidity of action of this governor made its operation impossible without the by-pass feature. It was at that time very much quicker in action than any governor on the market. It was a result of this quickness which led to the development of the by-pass mentioned. The first installation of this by-pass was put on as a second thought when the governor proved so rapid in action that the inertia effects rendered governing out of question. It was a complete remedy for an intolerable condition.

Q. 27. By Mr. Westall: You have used the language "governors on the market." Can you state in a general way what kind of governors were on the market at the time to which you have referred? That is to say, by what means they operate, and their general effect as governors, describing the mechanism at such length as may be necessary to make your explanation clear.

A. At that time the Pelton Water Wheel Company had in use a governor depending on differential action as between the variable speed of the water-wheel and the fixed speed of same from the separate mechanism. The Lombard governor was in use at that time, having

sufficient capacity for speed but not being able to use it on account of the inertia effects in the pipe-line. In a general way, the majority of these governors were fly-ball governors, sensitive to speed changes of the wheel.

Q. 28. I now call your attention to Complainant's Exhibit C, purporting to be a diagrammatic drawing of figure 1 of the Lyndon patent in suit, and ask you to state whether or not you have examined that drawing and whether you understand the same, and whether the devices there shown correspond with or correctly illustrate the device shown in figure 1 of the Lyndon patent in suit, and, if so, point out wherein it is not an accurate representation of that drawing.

Mr. Blakeslee: Objected to as leading.

A. I have examined Complainant's Exhibit C and have compared it with figure 1 of the Lyndon patent, and find that it represents in a general way the mechanism there shown and is correct, exhibiting the principles brought out. It is a very much plainer diagram to use than figure 1 of the Lyndon patent, especially as it avoids numerous errors and discrepancies in the Lyndon description and drawings. It has several minor discrepancies of its own, which are not of any importance.

Q. 29. By Mr. Westall: Will you please point out wherein the diagrammatic drawing referred to corrects discrepancies in the Lyndon drawing.

A. The Lyndon specification—

Mr. Blakeslee: Let it be noted at this point that the witness produced from his pocket what appears to be a memorandum or notes or observations, and that he has before him at the commencement of answering this

question the said memoranda, and we are not informed as to the contents or disclosures thereof nor as to who produced it or when.

Mr. Westall: Counsel for the defendant simply states that they are notes of his private memoranda, made at the time he examined the drawings, and inasmuch as the drawings and the Lyndon patent are somewhat complicated, he is now requested to refer to his notes made at that time, in order that the testimony be accurate and may point out the discrepancies that he has noted.

A. Referring to the notes for the purpose of saving time, I find that the Lyndon specification cannot be read in the drawings completely. Neither do the various views shown in the Lyndon patent correspond. In Exhibit C mentioned, these discrepancies have been avoided partly by showing the device of counter-clockwise movement instead of clockwise movement as mentioned in the specification. In figure 1 of the Lyndon patent contact 40 is shown as controlling electromagnet 15, while in figure 7 it is shown as controlling electromagnet 16. The Lyndon patent on page 3, line 75, spring 37b should be spring 38. On the same page, line 82, gear-wheel 9 should be, in accordance with the drawing, gear 10, gear 10 being the one controlled by electromagnet 15. On page 4, line 6, spring 28-29 should read 27-28, 29-29. On the same page, line 9, contacts 100-101 should read contacts 40-40a. On the same page, line 12, contacts 46a-46b should read 45-45a, 46-46a. On the same page, line 23, wires 92 98 should read 93 98. On the same page, line 25, magnet 32 should read magnet 64. On the

same page, line 26, wires 99 93 should read 99 92. On the same page, line 27, magnet 32 should read magnet 64. On the same page, line 30, ropes 53 should read ropes 51 52. The specifications read "a clockwise rotation of the water-wheel shaft, looking down on it." Exhibit C shows the contrary rotation.

All of these discrepancies make the specifications somewhat more difficult to understand, for which reason Exhibit C is a welcome substitute. In figure 7 lever 31 shown in connection with magnet 64 should be 61, to correspond with figure 1 of the Lyndon patent. On Exhibit C the circuit marked 35a should be 33a.

Q. 30. Then, if I have understood your answer, the diagrammatic drawing referred to, is not a correct copy of figure 1 of the Lyndon patent in suit. That is to say, it is not an accurate representation of that drawing without change?

Mr. Blakeslee: Objected to as calling for a sweeping conclusion.

A. Exhibit C has been modified in certain details to correct the inaccuracies and discrepancies which exist between the specifications and the drawings of the Lyndon patent. It correctly represents the general principles shown in that patent.

Q. 31. By Mr. Westall: Please define more fully what you mean by "general principles."

A. By "general principles" I mean that Exhibit C shows a water-wheel casing, water-wheel shaft, reversing-gear mechanism, gates operating shaft, the generator for speed-control, solenoid, controlling-lever, the operating lever 43 with its contact points, the returning-

device, the by-pass with its operating mechanism. All of these general principles are shown in figure 1 and in Exhibit C.

Q. 32. Referring to the springs shown at 29 29 and 27 28 in the drawing of Complainant's Exhibit C and in the Lyndon patent, I will ask you to state what you understand to be the function of those springs, how they aid, if at all, in the operation of the device that is shown in the Lyndon patent.

A. The springs 29 29 placed between collars 29a 29a and working from fixed part 30, the returning-mechanism consisting of rod 25, link 25a, clutch 22, the springs 27 and 28, placed between collars 27a and 28a, and working against control-lever 26, are inserted to permit clutch 22 to operate the return-mechanism and controls lever 26, at the same time permitting controlling-lever 26 to operate from solenoid 33 without interference from the returning mechanism. Fundamentally, these springs are not required in the mechanism inasmuch as clutch 22 can be put in operation by clutch 23 at any point in the circumference. The movement of clutch 22 cannot much exceed the range of control-lever 26. As far as the operation is concerned, the effect would be the same with the return-mechanism directly connected to the control-lever 26. As shown on the drawing, springs 27 28 disturb the function of spring 38, working against the pull of the solenoid core 34. The solenoid core 34 to be stable must have a range responsive to various speeds of the generator 8. At the neutral position of control-lever 26 the spring system 27 28, 29 29, is balanced exerting no pressure on control-lever 26. In this

position the pull on the solenoid core 34 is balanced by the tension of spring 38 modified by the action of spring 37 which, in itself, has no true function, its use serving simply to modify the portions of spring 38, the balance in this solenoid mechanism necessarily being between the pull on the core on the one hand and the extension of spring 38 on the other. When the control-lever 26 is moved from its neutral position by the core 34 it encounters a positive resistance in either direction, the result being that this positive resistance is added to an increasing spring tension in spring 38 in one direction, and added to a decreasing tension in spring 38 in the other, the result being a different action of one side and the other, due to changes in speed of the generator 8.

Q. 33. Have you ever known of a governor such as is illustrated in figure 1 of the Lyndon drawings, or such as corrected and lettered in Complainant's Exhibit C, being installed and being practically used anywhere?

Mr. Blakeslee: Objected to as calling for a conclusion and as leading.

A. I have never seen such a governor.

Q. 34. By Mr. Westall: As an engineer, please state whether or not you would recommend the use of a governor built according to Complainant's Exhibit C, and give your reasons fully for your answer.

Mr. Blakeslee: Objected to as irrelevant, immaterial and incompetent, and as calling for testimony predicated upon a conclusion.

Mr. Westall: Counsel for defendant suggests that the only conclusion is that Exhibit C exemplifies the device of the Lyndon patent.

Mr. Blakeslee: The question presupposes a certain definite structure, and that structure is not defined except in general terms, and the question is further objected to as therefore incomplete.

A. I would not recommend such a governor, because of its being complicated and inoperative. It would fail to accomplish the object aimed at, especially on account of lack of proper correlation of its various parts. The return-mechanism is immediately thrown into action when the gate-operating shaft moves. This action takes place before the gates have time to move to any extent. Furthermore, when the control-lever 26 is thrown out of action by the return-mechanism 22, 25, etc., it is free to immediately throw into contact again, producing a second throwing-out, and continuing in this manner regardless of gate movement. This action does not cease until the speed has returned to normal, enabling the solenoid 33 through its core 34 and spring 38 to maintain control-lever 26 in its neutral position. There is no time element permitted between the throwing-in of the contacts 40 or 41, controlling reversing-gear mechanism 9, 10 and 11, and the action of the returning-clutch 23 22, set into operation by contacts 45 45a, 46 46a. The mechanism shows practically simultaneous action of these parts. Furthermore, the mechanism fails to accomplish the complete result expected by reason of the fact that there is a definite relation between the angular movement of the main gate and the butterfly valve, whereas the discharge rates of these two elements are necessarily different throughout the range of action.

Q. 35. By Mr. Westall: You have mentioned the

complicated nature of the device, I believe, as a reason in support of your decision regarding recommending the device as an engineer. Will you please explain more fully what effect the complexity of the device would have on its operation or supposed operation?

A. It is a matter of general experience in engineering that every element added to a machine increases the liability to derangement and mal-adjustment.

Q. 36. I now call your attention to certified copy of letters patent No. 521085, dated June 5, 1894, and ask you to state whether or not you have examined said patent and understand the device therein shown and disclosed.

Mr. Blakeslee: This question is objected to on the grounds previously urged in respect to a number of the matters of purported defense in this action, namely, that it does not come within the pleadings, notice not being given of the same in the answer filed in this suit; and on the ground that the discussion of this purported patent is irrelevant, incompetent, and immaterial.

A. I have examined patent No. 521085 and understand the operation of the mechanism.

Q. 37. By Mr. Westall: Will you please explain the device therein shown and described, freeing the subject as far as possible from technical terms, and explaining fully the nature and operation of the device therein shown and described.

Mr. Blakeslee: The objection last noted will be understood as repeated to all testimony regarding this purported patent without the necessity of actual repetition.

A. The patent mentioned shows means for electrically controlling the gates of the water-wheel. The means

employed are a solenoid sensitive to load changes in the generator driven by the water-wheel, modified somewhat by an auxiliary shunt circuit. This solenoid, through its core, operates contact points, sending current from a battery or other source of power through one or the other of two electromagnets, which magnets shed friction wheels into contact with a friction-wheel driven from the water-wheel shaft. These friction-wheels form a reversing mechanism operated to close the gates, by moving in one direction and to open the gates by moving in the opposite direction, responsive to an increase or decrease in the load on the generator. The patent furthermore shows a means of cutting out this gate action, corresponding or in accordance with the movement of the water-gate-operating shaft. In general, the patent covers an electrical device sensitive to load changes modified by speed changes, controlling the source of power derived from the wheel by opening and closing the water-gates.

Mr. Westall: Counsel for defendant offers in evidence the patent referred to, being patent No. 521085, granted June 5, 1894, to C. S. English, and ask that it be received in evidence and marked "Defendant's Exhibit C. S. English Patent No. 521085."

Mr. Blakeslee: This offer is objected to on each of the grounds of objection registered against the testimony of the witness with reference to the purported English patent, and upon the further ground that it is not the best evidence, and there is no certification of the purported copy of the purported English patent; and the offer is further objected to on the ground that the purported

copy of English patent is not a patent at all, and there is no proof as to what it is in any respect, and particularly with respect to the purported dates appearing thereon.

Q. 38. By Mr. Westall: I now call your attention to the certified copy of the patent granted to E. P. Wetmore, dated May 8, 1894, No. 519597, and ask you to state whether you have read and examined the specifications of the patent referred to and the drawings thereof, and whether you understand the same.

A. I have read and examined the specifications and drawings of patent No. 519597 and understand the operation of the mechanism shown.

Q. 39. Will you please describe the device shown in the patent referred to and explain fully the operation of the mechanism therein disclosed and the results accomplished and the manner in which those results are accomplished, giving your reasons fully for any opinions you may express.

A. The patent mentioned, referring to figure 1, shows water-wheel case A, containing a wheel operating shaft B and driven from said shaft by means of pulleys b, generator CC', and a nest of pulleys consisting of one loose and two tight pulleys. This nest of pulleys enables the belt K to run without result when placed on the loose pulley, and to perform work when placed on either pulleys m or 1'. When this belt is shifted to the tight pulley m it operates through sleeve M ^{and} bevel gear m', driving bevel gear a' which through gate-operating shaft a, either opens or closes the water-gates, which are not clearly shown in the drawing. On the other hand, when belt K is shifted to the tight pulley 1', it operates

through the shaft L to the bevel gear 1 driving another bevel gear likewise marked a', the arrangement being such that this operation moves the main water-gates in either direction opposite to the first mentioned movement. The control mechanism for handling this water-wheel-derived power consists of one or more solenoids D D', which are energized by the current generated by the dynamo C in the one case and by the field circuit in the dynamo C', these two different methods being used to illustrate the applicability of the mechanism to direct an alternating current generator. On the core E of this system of solenoids is located a contact point G, which is connected to a source of electrical energy. On each side of this contact point is a contact plate, g' 2, each of which is connected to an electromagnet operating through core J, the shifting mechanism j' adapted to move the belt K from the loose pulley k to either one of the tight pulleys, this action being resultant upon decrease or increase of load on the generators. The patent shows further a means of connecting this shifting mechanism by means of the drop on the water-gate-operating shaft, operating the contacts g' g2. This cut-out mechanism is ready to operate at all times, and will stop the gate movement unless the solenoid core E follows up and re-establishes contact. The drawing shows an alternative method of controlling the solenoids I I' by the speed-sensitive fly-ball governor. In either case the core J of the solenoids is returned to its central position and pulls the belt K on the loose pulley by means of springs i i'. The general patent covers electrical means of controlling a water-wheel-derived power for opening and closing the gates,

and is provided with a cut-out mechanism to limit the gate movement.

Mr. Westall: Counsel for defendant offers in evidence the certified copy of the specifications and drawings of the patent referred to, being patent No. 519597, dated May 8, 1894, and granted to E. P. Wetmore, and asks that it be received in evidence and marked "Defendant's Exhibit Wetmore Patent No. 519597."

Mr. Blakeslee: This offer is objected to on the ground that the purported copy of the patent does not come within the pleadings in this case, notice of the same not being given in the answer filed; and on the ground that it is incompetent, irrelevant and immaterial to the issues in the case.

April 29, 1914, A. M.

S. L. BERRY, recalled. Direct examination resumed:
By Mr. Westall:

Q. 40. I now call your attention to Defendant's Exhibit C. S. English Patent No. 521085, and ask you to compare the disclosures of that patent with those of Complainant's Exhibit HH, the Lyndon patent in suit.

Mr. Blakeslee: Objected to on each of the grounds urged against the testimony previously given in connection with this purported patent and against the introduction of this purported patent, and as irrelevant, immaterial and incompetent.

A. Defendant's Exhibit C. S. English Patent 521085 shows an electrical-controlling mechanism for operating the water-wheel-derived power for opening and closing the water-wheel gates. The Lyndon patent shows an electrical mechanism for controlling water-wheel-derived

power for opening and closing water-wheel gates. The means employed to operate this controller in the English patent are the load current from the generator driven by the water-wheel, modified to a limited extent by the speed-sensitive current in the same machine operating contact points adapted to apply a secondary source of electrical current, as a battery or generator, to a double-acting solenoid, which, in turn, operates a friction-gear reversing device to apply water-wheel-derived power either to open or close water-wheel gates. Added load to the generator so operates this mechanism that the water-wheel gates are opened. Conversely, a decreased load in the generator operates the mechanism to close these gates. In the Lyndon patent the means employed to operate this electrical controller is a generator made sensitive to speed changes, operating through its accompanying solenoid and core to move the contacts controlling the application of the secondary source of electrical current, shown in this case as a generator, to operate a gear-reversing device which directs the water-wheel-derived power to open or close the water-wheel gates as required by the decrease or increase of the speed of the water-wheel. The two devices are the same in operation and, in a general sense, the same in means.

Q. 41. By Mr. Westall: Taking up Claim 1 of the Lyndon patent in suit, I will ask you to compare the structure there described with the C. S. English patent to which you have just referred.

A. Claim 1 in the Lyndon patent in suit No. 695220 reads: "In a governor for water-wheels, the combination with a water-gate-operating shaft and a driving

shaft." In the C. S. English patent No. 521085 the water-gate-operating shaft is marked a; the driving shaft is marked 8. "Adapted to connect the water-gate-operating shaft to the driving shaft in reverse driving relations." In the Lyndon patent the element mentioned consists of bevel gears 9, 10 and 11, operated by the clutch 13. In the C. S. English patent this element consists of the friction reversing gear 9, 10, and P, set in operation by longitudinal movement of the members 9 and 10.

"Means for reversely controlling the operation of such clutch-gear." In the Lyndon patent this means consists of the electromagnets 15 and 16, attracting the armatures 17 to one or the other, depending upon the increase or decrease in the speed of the wheel. In the C. S. English patent this means consists of the electromagnets M M', attracting the armature L to one or the other, depending on the changed conditions in the generator.

"A dynamo connected to be driven from the water-wheel and wound to maintain constant potential for varying currents therein, but to vary the potential in a greater ratio than the speed." In the Lyndon patent this dynamo is shown at 8. In the English patent this function is served by the main generator.

"An electromagnetic device connected to such dynamo, and controlling the clutch-gear-controlling means and means for resisting the action of said electromagnetic device in such manner that at normal speed the clutch mechanism will be disengaged but on increase or decrease from normal speed the clutch will be operated to govern the water-gate through its operating shaft."

In the Lyndon patent this is covered by the solenoid 33, its core 34, control-lever 26 with its contact points operating the secondary current to energize electromagnets 15 or 16, thus clutching either gear 10 or gear 9, as the case may be. These reference figures apply to figure 1 of the Lyndon patent and not necessarily to the other views. In the C. S. English patent this mechanism consists of the solenoid Z with its core i, contact points 3 and 4, connecting with contact points C' C2, controlling the secondary current to energize electromagnets M or M', thus operating through the lever L the gear-reversing mechanism either to close or open the gates.

The mechanism shown in these two patents are exactly identical with the single exception that in the Lyndon patent a special small generator is utilized and in the English patent the main generator is used for this purpose. I will add to the answer above, "The means for resisting the action of said electromagnetic device" in the Lyndon patent is found in the spring 38. The spring 37 shown has no true function and if used will simply serve to alter the proportions of spring 38. The balance is between the magnetic pull of the solenoid 33 on its core 34, acting in opposition to the tension of spring 38, modified to considerable extent by the interference of the action of springs 28, 27 and 29. The intention of the mechanism is evidently to product a balance between these conflicting forces in such a position that the lever 26 will remain in its neutral position in which both contacts 40 and 41 are open. In the C. S. English patent this resisting means is found in the disposition of the weights applied to the solenoid core i, and balance is ob-

tained by opposing to this weight the pull on the core i of the electromagnet Z, the design being such that the contact points are open whenever the generator is carrying its load at predetermined speed.

Q. 42. I will ask you to make the same comparison as to Claim 2 of the Lyndon patent in suit.

A. Claim 2 of the Lyndon patent in suit No. 695220 states: "In a governor for water-wheels, the combination with a water-gate-operating shaft and a driving shaft," these being shaft 12 and shaft 6 in figure 1 of the Lyndon patent. In the C. S. English patent the water-gate-operating shaft is shown at a and the driving shaft at 8.

"Of a reversing clutch-gear, adapted to connect said shafts in reverse driving relations." In the Lyndon patent this element consists of the gears 9, 10 and 11, set in operation by the clutch 13. In the C. S. English patent this element consists of the reversing gear parts 9 10 P, set in operation in one direction or the other by the longitudinal movement on the driving shaft 8 of the parts 9 10.

"Electromagnetic means controlling such clutch-gear." In the Lyndon patent this consists of the electromagnets 15 and 16 attracting, either the one or the other, the armature 17, operating through the lever 14 fulcrumed to 14a, the clutch 13. In the C. S. English patent this electromagnetic means consists of the electromagnets m m', attracting either to one or the other the armature L which, fulcrumed at O, longitudinally shifts the gear-reversing elements 9 10.

"A dynamo connected to be driven by the water-wheel

and wound so as to deliver an electromotive force varying in a greater ratio than the speed of the water-wheel." In the Lyndon patent this element is shown at 8. In the C. S. English patent this function is performed by the main generator which is responsive to changed conditions as to load and speed.

"A solenoid connected to said dynamo and a device controlled by said solenoid and carrying a contact device, and energizing connections for the electromagnetic gear-controlling means, controlled by said contact device." In the Lyndon patent this element consists of the solenoid 33 controlling through its core 34 the lever 26 operating contact devices at 40 and 41, adapted to energize the magnet 15, in the one case, and 16 in the other. In the C. S. English patent this element consists of the solenoid Z, energized by current from the main generator, acting on its core i, operating the lever forming a portion of said core, carrying contact points 3 and 4, adapted by closing on to their respective opposing contact points to energize the electromagnet M, in one case, and the electromagnet M' in the other, adapted to operate the gear-reversing elements 9 and 10. The means adapted in these two patents are identical in means and results with the single exception of the use of the special generator 8 in the Lyndon patent, while in the C. S. English patent the same function is performed by the main generator.

Q. 43. I will ask you to make the same comparison as to Claim 5 of the Lyndon patent in suit with C. S. English patent referred to.

A. Claim 5 in the Lyndon patent No. 695220 reads:

“In a water-wheel governor the combination with a water-gate-operating shaft, a driving shaft and a reversing clutch-gear, adapted to connect said shafts so as to cause the water-gate-operating shaft to move in either direction.” In the Lyndon patent, figure 1, the water-gate-operating shaft is marked 12; the driving shaft is marked 6; “A reversing clutch-gear adapted to connect said shaft so as to cause the water-gate-operating shaft to move in either direction” is shown at 9, 10 and 11. In the C. S. English patent “water-gate-operating shaft” is shown at a; the driving shaft at 8 and “a reversing clutch-gear adapted to connect said shafts so as to cause the water-gate-operating shaft to move in either direction” is shown by the parts 9 10 and P.

“A dynamo operatively connected to produce an electromotive force responsive to the speed of the water-wheel.” In the Lyndon patent this is the dynamo shown at 8. In the C. S. English patent this is not shown, but the main generator performs the function.

“A solenoid device energized by said dynamo.” In the Lyndon patent this is the solenoid 33. In the English patent it is the solenoid Z.

“A core for said solenoid and a circuit-controller actuated thereby.” In the Lyndon patent this core is shown at 34, and the circuit-controller at 26. In the English patent the core is marked i and the lever forms part thereof, containing the contact points 3 4.

“Springs for holding the circuit-controller in normal position.” In the Lyndon patent the springs are shown at 38 37, the action of which may be modified by the influence of the springs 28 27 29 29. In the C. S. English

patent the function of these springs is performed by the appropriate distribution of the weights tending to counteract the pull of the solenoid Z.

“Two electromagnetic devices for reversely operating the reversing clutch-gear.” In the Lyndon patent these electromagnetic devices are the magnets 15 16, operating, through the armature 17 and the lever 14, fulcrumed at 14a, the clutch 13. In the C. S. English patent these devices consist of the electromagnets M M', operating through the armature L, fulcrumed at O, and the reversing elements 9 and 10.

“A returning device adapted when operated to return the circuit-controller to normal position, a clutch adapted to bring said returning device into operative connection with the water-gate-operating shaft, a magnet controlling said clutch and a circuit for said magnet including a circuit-closer operatively connected with the aforesaid circuit-controller and adapted to energize said magnet on movement of the circuit-controller in either direction.” In the Lyndon patent this returning device consists of the clutch member 23, so connected as to rotate with the water-gate-operating shaft 12, but free to move longitudinally thereon; the clutch member 22, freely mounted on water-gate-operating shaft 12, link 25a, connecting clutch member 22 with the rod 25; the rod 25 being connected through springs 27 28 with the control-lever 26, and having springs 29 29 working between collars 29a 29a and contacting with a fixed frame portion 30. The clutch member 23 is moved longitudinally on the water-gate-operating shaft 12 by means of the lever 24, fulcrumed at 24a, and set in operation by armature

31 when attracted by electromagnet 32, the electromagnet 32 being energized by the secondary current set in operation by the contacts 45 46, forming parts of and mounted on secondary control-lever 43 which is flucrummed at 43a and operated in the one direction when the core 34 of the electromagnet 33 moves in either direction. In the C. S. English patent this return mechanism consists of a belt b driving the pulley P2 mounted on the shaft b', having thereon drum 15 adapted to receive the flexible connection c attached to the lever L at 12. The lever L' is flucrummed at 2 and carries the contact points C' and C2 placed oposite to contacts 3 and 4, operated by means of the solenoid core i; and weight W, operating by means of flexible connections over the wheel 11 and connected to the lever L' at 12 provides a means by which flexible connection C is kept taut at all times. The operation of this device is as follows: On movement of the gate-operating shaft a, the flexible connector C is wound on or unwound from the drum 15, resulting in the operation of the lever L' either in one direction or the other, depending upon the direction of motion of the water-gate-operating shaft a. The device is so arranged that this resultant movement opens the connection which had previously been closed, thereby stopping further movement of the water-gate-operating shaft a. In a general way these mechanisms shown in the two patents contain the same means and obtain the same result, with the exception that the return device in the Lyndon patent operates irrespective of the nature or extent of the movement of the water-gate-operating shaft 12, whereas in the C. S. English patent this movement is consequent

upon a movement of the water-gate-operating shaft and is adapted to follow up changing load on the generator in such a manner that the opening of contacts will not take place until the generator becomes normal as to speed. In the Lyndon patent the arrangement of the returning device in its relation to the other operations is such as to make it absolutely inoperative.

Q. 44. Referring now to Defendant's Exhibit Wetmore Patent No. 519597, I will ask you to compare generally the device therein described and illustrated with that of the Lyndon patent in suit.

Mr. Blakeslee: The same objections as previously noted with respect to any attempted use of this Wetmore patent in relation to any of the issues in this suit.

A. Defendant's Exhibit Wetmore Patent No. 519597 in a general way covers a water-wheel, generators driven therefrom, solenoids responsive to load and speed changes in said generators, contact devices controlling secondary source of electric current to operate electromagnets moving either in one direction or the other, shifting device adapted to reversely connect the water-gate-operating shaft with the driving shaft. Furthermore, it shows a return mechanism operated from the water-gate-operating shaft tending to stop further movement of the water-gates when the load and speed conditions in the generators become again fixed. Lyndon patent No. 695220 shows a water-wheel, a generator driven therefrom controlling through electromagnetic means, contact devices operating solenoids adapted to operate a clutch-gear reversing mechanism connecting the water-gate-operating shaft in reverse driving rela-

tions to the driving shaft. It shows, furthermore, a returning mechanism operated by the water-gate-operating shaft, tending to stop further action of the water-gates immediately. The two patents will show similar means and similar results, except in the relation of the returning devices to the other parts.

Q. 45. By Mr. Westall: Referring now to Claim 1 of the Lyndon patent in suit, I will ask you to compare the structure there described with that of the Defendant's Exhibit Wetmore Patent, to which you have referred in your last answer.

Mr. Blakeslee: The same objection is repeated as to any testimony in connection with this purported Wetmore patent.

A. Claim 1 in the Lyndon patent No. 695220 reads: "In a governor for water-wheels, the combination with a water-gate-operating shaft and a driving shaft." In the Lyndon patent the water-gate-operating shaft is shown at 12, and the driving shaft at 6. In the Wetmore patent the water-gate-operating shaft is shown at a and the driving shaft at B.

"Of a reversing clutch-gear, adapted to connect the water-gate-operating shaft to the driving shaft in reverse driving relations." In the Lyndon patent these parts are shown at 9 10 and 11 with the clutch 13. In the Wetmore patent these parts are bevel gears 1 and m', driving bevel gears a' a', together with the shafts L and sleeve M, the pulleys 1' and m fixed to the shaft L and the sleeve M, the loose pulley k, the belt K and the pulley b.

"Means for reversely controlling the operation of

such clutch-gear." In the Lyndon patent this means consists of the electromagnets 15 16, armature 17, lever 14 fulcrumed at 14a. In the Wetmore patent this means consists of electromagnets I I', core J containing the shifting arms j' adapted to shift the belt K, loose pulleys k, either a pulley m fastened to the sleeve M, or to the pulley 1' fastened to the shaft L, giving a reversing action through the reverse arrangement of the bevel gears m' a' and 1 a'.

"A dynamo connected to be driven from the water-wheel and wound to maintain constant potential for varying currents therein, but to vary the potential in a greater ratio than the speed." In the Lyndon patent this dynamo is shown at 8. In the Wetmore patent this function is performed by the main generator.

"An electromagnetic device connected to such dynamo, and controlling the clutch-gear-controlling means." In the Lyndon patent this consists of the solenoid 33, its core 34, the control-lever 26 operating the contacts 40 41 by means of which the electromagnets 15 and 16 are energized. In the Wetmore patent this electromagnetic device consists of one or more solenoids D D' responsive to changing conditions in the generators driven from the water-wheel and operating solenoid core E, having thereon the contact point G adapted by contact either with contact strip g' or contact strip g2 to energize the electromagnets I' or I.

"And means for resisting the action of said electromagnetic device in such manner, that at normal speed the clutch mechanism will be disengaged, but on increase or decrease from normal speed the clutch will be operat-

ed to govern the water-gate through its operating shaft.” In the Lyndon patent this element consists of the spring 38 resisting the pull of the solenoid core 34. In the Wetmore patent this resisting means is found in the spring F, the tension of which resists the pull of the solenoid core E.

Q. 46. By Mr. Westall: I will now ask you to make the same comparison as to Claim 2 of the Lyndon patent in suit.

A. Claim 2 of the Lyndon patent in suit No. 695220 reads: “In a governor for water-wheels, the combination with a water-gate-operating shaft and a driving shaft.” The water-gate-operating shaft is shown at 12; the driving shaft at 6. In the Wetmore patent the gate-operating shaft is shown at a, the driving shaft at B.

“Of a reversing clutch-gear, adapted to connect said shafts in reverse driving relations.” In the Lyndon patent this consists of the gears 9, 10 and 11, with the clutch 13. In the Wetmore patent this consists of the gears m’ a’, and the gears 1 and a’ with their attached driving members and pulleys.

“Electromagnetic means controlling such clutch-gear.” In the Lyndon patent this consists of electromagnets 15 16 operating through the armature 17, lever 14 fulcrumed at 14 a and moving the clutch 13. In the Wetmore patent this consists of the electromagnets I I’, armature J moving in one direction or the other, belt shifting arm j’.

“A dynamo connected to be driven by the water-wheel and wound so as to deliver an electromotive force varying in a greater ratio than the speed of the water-wheel.”

In the Lyndon patent this is shown at figure 8. In the Wetmore patent this function is performed by the main generator or generators.

“A solenoid connected to said dynamo and a device controlled by said solenoid and carrying a contact device, and energizing connections for the electromagnetic gear-controlling means, controlled by said contact device.” In the Lyndon patent this includes the solenoid 33, its core 34, lever 26, contacts 40 41, adapted to energize electromagnets 15 16. In the Wetmore patent this includes one or more solenoids D D', core E carrying the contact point G adapted to contact with either g' or g² to energize the electromagnets I' or I.

Q. 47. Please now make the same comparison as to Claim 5 of the Lyndon patent in suit.

A. Claim 5 of the Lyndon patent reads: “In a water-wheel governor the combination with a water-gate-operating shaft, a driving-shaft and a reversing clutch-gear, adapted to connect said shafts so as to cause the water-gate-operating shaft to move in either direction.” In the Lyndon patent the water-gate-operating shaft is shown at 12, the driving-shaft at 6, the reversing clutch-gear 9 10 11 13. In the Wetmore patent the water-gate-operating shaft is shown at a, the driving shaft at B, the reversing clutch gear at m' a', 1 a', sleeve M, shaft L, pulleys m 1' and k.

“A dynamo operatively connected to produce an electromotive force responsive to the speed of the water-wheel.” In the Lyndon patent this dynamo is shown at 8. In the Wetmore patent at C and C', either one or both being used.

“A solenoid device energized by said dynamo.” In the Lyndon device this is shown at 33. In the Wetmore patent at D and D', one or both being used.

“A core for said solenoid and a circuit-controller actuated thereby.” In the Lyndon patent the core is shown at 34, the circuit-controller at 26. In the Wetmore patent the core is shown at E and the controller by sliding frame H containing the contact points g' g2.

“Springs for holding the circuit-controller in normal position.” In the Lyndon patent the spring performing this function primarily is 38. In the Wetmore patent the spring is shown at F. In both cases these springs resist the pull of the solenoid cores.

“Two electromagnetic devices for reversely operating the reversing clutch-gear.” In the Lyndon patent these two electromagnetic devices are the electromagnets 15 and 16. In the Wetmore patent these two electromagnetic devices are shown as I I'.

“A returning device adapted, when operated, to return the circuit-controller to normal position, a clutch adapted to bring said returning device into operative connection with the water-gate-operating shaft, a magnet controlling said clutch and a circuit for said magnet, including a circuit-closer operatively connected with the aforesaid circuit-controller and adapted to energize said magnet on movement of the circuit-controller in either direction.” In the Lyndon patent this returning device consists of the following parts: the clutch member 23 moveable longitudinally on the gate-operating shaft 12 by means of the lever 24 operated by the armature 31 when attracted by the electromagnet 32 on being ener-

gized by secondarily circuit controlled by contact points 45 46, clutch member 22 loosely mounted on gate-operating shaft 12, moving rod 25 by means of a connecting link 25, which rod 25 is connected through springs 27 28 to control lever 26. In the Wetmore patent this returning device consists of the drum h2 mounted on the water-gate-operating shaft a and operating the sliding frame H through a flexible connection h', the aforesaid connection, h', being held taut at all times by the weight h5 working through the flexible connection h3. The sliding frame H carries contact strips g' g2, connected responsively to the electromagnets I' and I. The movement of this sliding frame H tends to open the contacts between G and g' or g2, and thus stop further movement in the water-gate-operating shaft. In general, these two patents cover identical means and results, except that in the Lyndon patent the returning device goes into action immediately upon movement of control-lever 26 through the control-lever 43, whereas in the Wetmore patent the return movement is consequent upon the movement of the water-gate-operating shaft, and the disconnection will not take place until the main driving generators have returned to normal speed, the returning devices being in the nature of a follow-up movement.

April 29, 1914, P. M.

EDWARD B. STRONG, produced as a witness on behalf of the defendant, being first duly sworn, deposed as follows:

DIRECT EXAMINATION.

By Mr. Westall:

Q. 1. Please state your name and business.

A. Edward B. Strong; president and general manager of the Technical Publishing Company.

Q. 2. Where do you live?

A. I reside in San Rafael.

Q. 3. Are you connected in any way with the Journal of Electricity?

A. Yes, sir.

Q. 4. In what capacity are you connected with that publication?

A. The Technical Publishing Company publishes The Journal of Electricity.

Q. 5. I now show you Defendant's Exhibit Journal of Electricity, Vol 2, and Defendant's Exhibit Journal of Electricity, Vols. 4 and 5, and ask you to state or not the volumes referred to, and if so, by what name, namely, --

934 26 add "By consent of counsel the direct examination of the witness S. L. Berry is interrupted for the purpose of taking the deposition of Edward B. Strong," and on the basis of proof, the witness not having qualified to answer the question.

A. To the best of my knowledge and belief they are copies of the issue of the Journal of Electricity, Vol. 2 and Vol. 3. I have not gone through carefully to see if the whole volumes are there. And Vol. 4 and Vol. 5. I won't say how complete they are. They appear to be all there.

Q. 6. By Mr. Westall: You have referred to Vol. 3 of the Journal of Electricity while going through the book marked Vol 2. Do you find that the cover contains

gized by secondarily circuit controlled by contact points 45 46, clutch member 22 loosely mounted on gate-operating shaft 12, moving rod 25 by means of a connecting link 25, which rod 25 is connected through springs 27 28 to control lever 26. In the Wetmore patent this returning device consists of the drum h2 mounted on the water-gate-operating shaft a and operating the sliding frame H through a flexible connection h', the aforesaid connection, h', being held taut at all times by the weight h5 working through the flexible connection h3. The sliding frame H carries contact strips g' g2, connected responsively to the electromagnets I' and I. The movement of this sliding frame H tends to open the contacts between G and g' or g2, and thus stop further movement in the water-gate-operating shaft. In general, these two patents cover identical means and results, except that in the London patent the returning device goes into action im-

26 through

will not take place until the main driving generators have returned to normal speed, the returning devices being in the nature of a follow-up movement.

April 29, 1914, P. M.

EDWARD B. STRONG, produced as a witness on behalf of the defendant, being first duly sworn, deposed as follows:

DIRECT EXAMINATION.

By Mr. Westall:

Q. 1. Please state your name and business.

A. Edward B. Strong; president and general manager of the Technical Publishing Company.

Q. 2. Where do you live?

A. I reside in San Rafael.

Q. 3. Are you connected in any way with the Journal of Electricity?

A. Yes, sir.

Q. 4. In what capacity are you connected with that publication?

A. The Technical Publishing Company publishes The Journal of Electricity.

Q. 5. I now show you Defendant's Exhibit Journal of Electricity, Vol 2, and Defendant's Exhibit Journal of Electricity, Vols. 4 and 5, and ask you to state whether or not the volumes referred to are what they purport to be, namely, volumes of the Journal of Electricity published by your company?

Mr. Blakeslee: Objected to as leading, and on the ground that no foundation is laid, that it is not the proper method of proof, the witness not having qualified to answer the question.

A. To the best of my knowledge and belief they are copies of the issue of the Journal of Electricity, Vol. 2 and Vol. 3. I have not gone through carefully to see if the whole volumes are there. And Vol. 4 and Vol. 5. I won't say how complete they are. They appear to be all there.

Q. 6. By Mr. Westall: You have referred to Vol. 3 of the Journal of Electricity while going through the book marked Vol 2. Do you find that the cover contains

more than Vol. 2 of the Journal of Electricity, referring to Defendant's Exhibit Journal of Electricity Vol. 2?

A. Yes; I find copies of Vol. 3 in here marked "Vol. 3." I can compare them, if there is any question. I don't know anything about the binding of it, of course.

Q. 7. So that apparently the printed number on the back of the volume is inaccurate in that the volume contains both Vols. 2 and 3?

Mr. Blakeslee: Objected to as leading. Let the witness testify what he knows about this alleged publication and how fully he knows about it, if anything.

A. I find under that cover copies of Vol. 2 and Vol. 3. But, as I said, I do not know how complete they are. I would have to compare them with our own files to state any further.

Mr. Westall: In view of the testimony of the witness just given, we will ask the Examiner to correct the marking of the volume introduced as Defendant's Exhibit Journal of Electricity Vol. 2, making it Vols. 2 and 3.

Mr. Blakeslee: We object to changing the marking of this exhibit on the ground that it amounts to a re-offer of the exhibit, and the objections made to the original offer of these exhibits are repeated to such attempted or purported re-offer, and we further object on the ground that the witness has not qualified and that this is not the proper method of proof, and that the purported publications are not identified.

Q. 8. By Mr. Westall: How long have you been connected as president, or otherwise, with the Journal of Electricity?

A. Since 1905.

Q. 9. Were you connected with that company during the years 1896, 1897 and 1898?

A. I was not.

Q. 10. Who had charge of the publication of that magazine during that time?

A. To the best of my knowledge George P. Low and Dr. Perrine.

Q. 11. Are either of the gentlemen you have mentioned living now?

A. They are not.

Q. 12. Have you anyone in your employ who was connected with the Journal of Electricity during the years I have mentioned?

A. No; we have not.

Q. 13. Referring to Defendant's Exhibit Journal of Electricity Vols. 2 and 3, I now call your attention to an article therein under date of May, 1896, entitled "A Mexican Transmission Plant. By George J. Henry, Jr." and ask you to state whether you have compared that article in any way with your original files of the Journal of Electricity now in your custody?

Mr. Blakeslee: Objected to as irrelevant, incompetent and immaterial, and on the ground that the publication in question is not identified, and on the ground that the original publication is not identified, and that it does not call for the best evidence, there being no foundation laid for the introduction of this testimony.

A. I could not answer positively as to this particular article. This morning I compared a number of articles in this volume with our files in the office and found them

to be the same; but I could not specify any one particular one.

Q. 14. By Mr. Westall: Have you in your custody now complete original files of the Journal of Electricity, or, if not, what becomes of the original files?

Mr. Blakeslee: Objected to as leading and calling for a conclusion of the witness, and not the best evidence.

A. They were destroyed by the fire—our own original files.

Q. 15. By Mr. Westall: By what fire?

A. By the fire of 1906.

Q. 16. So that at the present time you have not been able to complete your files? Is that correct?

A. There are two volumes that we are not entirely completed on.

Q 17. Have you at the present time succeeded in supplying the missing files for 1896, 1897 and 1898?

A. I have them over at my office now; yes.

Q. 18. I now call your attention to an article on page 60 of Vol. 3 of Defendant's Exhibit Vols. 2 and 3 of the Journal of Electricity, and ask you whether you remember having compared that with your files.

Mr. Blakeslee: Objected to as irrelevant, immaterial and incompetent; no foundation laid and not calling for the best evidence.

A. My answer would be the same to this as it was to the first.

Q. 19. By Mr. Westall: You have not any distinct recollection of comparing this?

A. I could not specify any particular one article which I compared.

Q. 20. You do recognize this as the Journal of Electricity which you compared this morning?

A. To the best of my knowledge and belief.

Q. 21. And the various articles herein given as articles of the Journal of Electricity?

Mr. Blakeslee: The same objection.

A. Yes.

Mr. Westall: I believe that is all.

CROSS-EXAMINATION.

By Mr. Blakeslee:

Q. 22. Have you any of the original files of the Journal of Electricity for the years 1896, 1897 and 1898?

A. Not that I know of. You mean the ones we had in our office before the fire?

Q. 23. Yes.

A. Not that I know of.

Q. 24. You were not connected with that publication during those years?

A. No, sir.

Q. 25. Have you any personal knowledge of the publication, binding and filing of the volumes which you have in the files of the Journal of Electricity for the years 1896, 1897 and 1898?

A. The owner of them told me he had filed them. Would that be personal knowledge of a filing?

Q. 26. I am not prepared to decide that point. I will only tell you more particularly what I want to know. I will state this: Were you cognizant of any acts connected with the publication and binding and filing of those volumes at the times they were published and

bound and filed? Did you witness any such acts, or were you present during any such acts, or did you have anything to do with such acts?

A. No, sir.

S. L. BERRY, recalled. Direct examination resumed.

Q. 48. By Mr. Westall: I now call your attention to Defendant's Exhibit Lamb Patent, and ask you to state whether or not you have read, studied, and whether you understand the device therein shown and illustrated?

Mr. Blakeslee: All of the objections heretofore registered with respect to this purported exhibit Lamb Patent are repeated, and they will be understood to be repeated without specific repetition as to every question put to this witness or any other witness with respect to the purported Lamb patent, such objections more particularly being that the Lamb patent only came within the pleadings in this case as a prior publication, and upon the very face of the patent it is evident that it is not a publication prior to the invention of the Lyndon patent in suit.

A. I have read this exhibit Lamb patent and have studied the specifications, drawings, and understand the mechanism there shown.

Q. 49. By Mr. Westall: Will you please describe the device therein shown and illustrated, explaining the operation of the various parts as you understand it, giving your reasons in full for any opinions you may express?

A. The Lamb patent, figure 1, shows the water-wheel of an impulse type marked 2, mounted on shaft 3, surrounded by a pipe or reservoir 4 supplied with water

through opening 5, having nozzles 6 6 6 6 7 8. The nozzles 6 6 6 6 as shown are of the simple type used to direct water to drive wheel 2; the nozzle 7 is also used to drive wheel 2, but contains a valve 9 by means of which water flowing through nozzle 7 can be varied. It also shows a valve on the opposite side of the wheel also

940 5 insert "Mr. Blakeslee: In view of the testimony of the witness, we renew all of our objections to the Defendant's Exhibits Journal of Electricity, Vols. 2, 4 and 5, and Vol. 3 as attempted to be offered in evidence, particularly on the ground that the best evidence has not been produced; that the volumes offered have not been properly identified, and that no witness qualified to identify such volumes has been produced."

in reverse direction. The levers 18 18 are connected by links 21 21 to the double levers 20 20 fulcrumed to the main base. To the ends of these levers 20 are links 23 connected at their upper ends by bar 24 24 which, in turn, is moved either up or down by the rod 25 described as being operated by any type of governor which may be driven from the shaft 3 of the water-wheel. The disposition of these various parts is such that on the downward movement of the rod 25 one valve is opened and the other closed. Reversely, an upward movement of the rod 25 will cause the first mentioned valve to be closed and the second mentioned valve to be opened. The proportion of by-pass nozzles to driving nozzles vary to suit conditions, as specified in the patent. The object of this patent is to control the application of water to drive this wheel forward in such

bound and filed? Did you witness any such acts, or were you present during any such acts, or did you have anything to do with such acts?

A. No, sir.

S. L. BERRY, recalled. Direct examination resumed.

Q. 48. By Mr. Westall: I now call your attention to Defendant's Exhibit Lamb Patent, and ask you to

the very face of the patent it is evident that it is not a publication prior to the invention of the Lyndon patent in suit.

A. I have read this exhibit Lamb patent and have studied the specifications, drawings, and understand the mechanism there shown.

Q. 49. By Mr. Westall: Will you please describe the device therein shown and illustrated, explaining the operation of the various parts as you understand it, giving your reasons in full for any opinions you may express?

A. The Lamb patent, figure 1, shows the water-wheel of an impulse type marked 2, mounted on shaft 3, surrounded by a pipe or reservoir 4 supplied with water

through opening 5, having nozzles 6 6 6 6 7 8. The nozzles 6 6 6 6 as shown are of the simple type used to direct water to drive wheel 2; the nozzle 7 is also used to drive wheel 2, but contains a valve 9 by means of which water flowing through nozzle 7 can be varied. It also shows a valve on the opposite side of the wheel also marked 9, supplying water to drive the wheel in reverse direction. The valve 9 serves to control the amount of water permitted to flow through nozzle 8. Each of these nozzles is operated through its stem 12 passing through bearings on the main frame by the levers 18 18 secured to said stems 12 12 by set-screws 19 19. In figure 4 of this patent there is shown a system of levers, connecting rods, bar and governor-operated rod, by means of which the valves 9 9 controlling the supply of water to nozzle 7 8 can be operated in reverse direction. The levers 18 18 are connected by links 21 21 to the double levers 20 20 fulcrumed to the main base. To the ends of these levers 20 are links 23 connected at their upper ends by bar 24 24 which, in turn, is moved either up or down by the rod 25 described as being operated by any type of governor which may be driven from the shaft 3 of the water-wheel. The disposition of these various parts is such that on the downward movement of the rod 25 one valve is opened and the other closed. Reversely, an upward movement of the rod 25 will cause the first mentioned valve to be closed and the second mentioned valve to be opened. The proportion of by-pass nozzles to driving nozzles vary to suit conditions, as specified in the patent. The object of this patent is to control the application of water to drive this wheel forward in such

a manner that as this water is decreased in amount through the nozzle 7 by the valve 9, an equal quantity of water can be shut off from the nozzle 8 by means of its valve 9, the object being to control the power of the wheel and maintain a constant flow in the conduit. In figure 1 the set-screw 14 in contact with the end of the valve 12 is for the purpose of taking up thrust produced by the water under pressure within the reservoir, which tends to force outward said stem 12. This outward pressure exists in all bodies subject to pressure of liquid within a vessel and exposed to atmospheric pressure outside of the vessel. Set-screw 14 placed as shown is a device reducing the friction consequent upon such outward pressure. Figure 3 shows a cross-section of the valve 9 within its housing 10, having ports 11 which by twisting the valve 9 about its center can be made to register or fail to register, as may be determined by the said movement. In general, this patent covers a water-wheel, means for supplying water thereto, nozzles for applying power and nozzles for supplying water to the wheel, and by-pass means by which water can be diverted from this purpose as varying the quantity applied to drive the wheel and still maintain constant flow in the conduits.

Q. 50. Referring now to Complainant's Exhibit HH, the Lyndon patent in suit, I will ask you to compare the device of the Lamb patent, which you have described, with that of Lyndon.

A. The Lyndon patent shows a water-wheel and conduit, a by-pass and valve controlling the by-pass, and means of operating the water-gates in either direction,

means for operating the by-pass valve in an inverse direction to that of the water-gates. The Lamb patent shows the water-wheel with conduit, means for operating the water-gates in either direction, means for operating the by-pass gates in reverse direction to that of the water-gates. The purpose of both patents is to maintain constant pressure within the conduit.

Q. 51. Referring now to claims of the Lyndon patent in suit, I will ask you to compare the device disclosed in the Lamb patent with the claim mentioned of the Lyndon patent.

Mr. Blakeslee: We object to the question as calling for a conclusion and as necessarily predicated upon an interpretation of that portion of the Lamb patent embodied in Claim 6, not the proper method of proof, the witness not being qualified, and not calling for a comparison of structures per se.

Q. 52. By Mr. Westall: The question is withdrawn. I call your attention to Claim 6 of the Lyndon patent and I will ask you to compare the device therein disclosed, that is to say, the combination of elements therein mentioned, with the device shown and disclosed in the Lamb patent to which you have referred, and point out any similarities or differences that you may find, stating in full your reasons for any opinions you may express.

Mr. Blakeslee: The same objection is repeated unless the witness makes comparison of specific structures.

A. Claim 6 of the Lyndon patent reads: "In a water-wheel governor, the combination with means for operating the water-gate in either direction, a by-pass for the water-wheel, and a valve controlling said by-pass, of

means connected to the water-gate-operating means and operating the by-pass valve inversely to the operation of the water-gate." In the Lamb patent "means for operating the water-gate in either direction" are shown in the governor mentioned in the specifications as being driven from water-wheel shaft 3 and raising or lowering the rod 25, acting through bar 24, link 23, lever 20, link 21, lever 18, stem 12, to turn the valve 9 in nozzle 7 in one direction or the other, depending on whether the speed has increased or decreased. "A by-pass for the water-wheel and a valve controlling said by-pass." The by-pass in the Lamb patent is the nozzle 8 controlled by its valve 9. The object of a by-pass in machinery of this description is to allow a variation in the supply of water to the wheel to drive it without causing a change of velocity in the conduit. As far as this object is concerned, it is immaterial what becomes of the water so diverted from driving the wheel. In the Lamb patent this by-passed water which, by the closing of valve 9 in nozzle 7, has been diverted from its previous condition of driving the wheel, is discharged through nozzle 8 under control of its valve 9. These nozzles and valves being of the same size, the by-pass valve opening as the driving nozzles close, the by-pass will discharge the same quantity of water diverted by the driving nozzle 7. The effect of this mechanism is not only to divert the water from driving the wheel but to assist the steadying of the speed of the wheel. It accomplishes this object in the following manner: Should the load on the wheel be decreased, it will tend to speed up the governor closing nozzle 7 by means of its valve 9 and opening nozzle 8 by means of

its valve 9, the discharge from nozzle 8 tending to retard the speeding up before mentioned. Conversely, should the load on the wheel increase, it tends to slow down. The governor increases the discharge of nozzle 7 by means of its valve 9 and decreases the discharge of nozzle 8 by means of its valve 9. The removal of the reverse driving water tends to permit the speeding up of the wheel.

“Of means connected to the water-gate-operating means operating the by-pass valve inversely to the operation of the water-gate.” In the Lamb patent these means consist of bar 24, being part of the same bar used in the control of the water-wheel driving nozzle, link 23, double lever 20, the link 21, lever 18, stem 12. The arrangement of parts is such that as the water-gate moves in one direction the by-pass nozzle moves in reverse direction. Claim 6 of the Lyndon patent describes the means and results shown in the Lamb patent.

Mr. Blakslee: We ask that that portion of the answer stating that it is immaterial what becomes of the water by-passed, or words to that effect, be stricken out as not responsive to the question.

Q. 53. By Mr. Westall: Assuming that Lyndon shows an operative device which will produce the results apparently aimed at by him, I will ask you to state from ~~comparison of the device of the Lamb patent and that of~~ your comparison of the device of the Lamb patent and that of the Lyndon patent, what effect would result in water-wheel governing as effected by Lyndon, which is not effected by Lamb, if any?

Mr. Blakeslee: Objected to as leading and suggestive, not the proper method of comparison, and, therefore, not

the proper method of proof, and calling for sweeping conclusions.

A. The Lyndon patent provides for a constant waste of water in order to be ready to supply water demanded by the wheel in case of a heavier load being put on it, and provides also for by-passing a greater quantity of water should a decreased load be placed on the wheel. In the Lyndon specifications, page 2, line 72, the capacity of the by-pass is limited to a small percentage of the area of the feed gate. By such limitation the device is capable of taking care of a like small percentage of load variation. Should the load variation exceed this small percentage, the mechanism becomes inoperative and the effects which he desires to avoid will obtain. In the Lamb patent, while the drawing shows five driving nozzles and one by-pass nozzle, the specifications state, on page 1, line 64, "the proportion of driving-nozzles to the brake-nozzle may be varied to suit conditions." By means of varying these proportions the Lamb mechanism is capable of taking care of an entire load change. This will be done when the number of by-pass nozzles is one-half of that of the driving nozzles, it being evident that if there are four driving nozzles, two of which are provided with valves, and two by-pass nozzles provided with valves, that the closing of the two driving nozzles provided with valves will reduce the power fifty per cent. This water then being passed through the by-pass nozzles will counteract the effect of the two driving nozzles not provided with valves. In general, the Lyndon patent has as a necessary condition constant waste of water which, at full load on the water-wheel, will amount to one-half the

capacity of the by-pass mechanism, which quantity of water must be added to that provided for driving the wheels, whereas in the Lamb patent the total amount of water necessary to provide is simply that called for by the full capacity of the wheel.

Q. 54. By Mr. Westall: In order to effectuate the objects proposed by Lyndon, what proportion would the by-pass have to be as compared with the main nozzle, meaning by those objects the obtaining of the widest possible margin of variation?

Mr. Blakeslee: Objected to as calling for a conclusion.

A. In the Lyndon mechanism as shown, in order to obtain the object which he desires to the fullest extent, the capacity of the by-pass would have to be equal to that of the main water-gates, so that there will be at full load on the wheel an excess quantity of water amounting to one hundred per cent flowing through the pipes. In other words, a plant of this nature, to fully realize his objects, would have to be supplied with 100% more water than would be required to develop the full power of the wheel. Any reduction in this proportion limits the variability of the device to a like reduction of load variation. His object is to govern the wheel by maintaining a constant pressure in the conduit regardless of waste of water.

Q. 55. By Mr. Westall: As a practical engineer, what have you to say of the practicability of the use of a structure modified as you have suggested that the Lyndon device should be modified, where water economy was desirable?

A. In those cases where water economy is a neces-

sary feature, mechanism of this sort would be out of question on account of the large proportion of waste water at full load.

Q. 56. Please now compare the device shown and disclosed in the Lamb patent referred to with the combination of elements described in Claim 7 of the Lyndon patent in suit.

A. Claim 7 of the Lyndon patent in suit, No. 695220, reads: "In a water-wheel governor, the combination with means for operating the water-gate in either direction from normal position." In the Lamb patent we find these means in a governor driven from water-wheel shaft 3, rod 25, bar 24, link 23, double lever 20, link 21, lever 18, stem 12, being arranged to operate valve 9 in nozzle 7 in either direction according as the speed of the wheel increases or decreases.

"A by-pass for the water-wheel, and a valve for such by-pass." In the Lamb patent this by-pass valve is found in nozzle 8 with its valve 9.

"Of means connected to the water-gate-operating means and adapted to operate the by-pass valve from normal position in either direction, so as to control such valve inversely to the control of the water-gate, during the governing action of the water-gate, and means for returning the by-pass valve to normal position on completion of governing movement of the water-gate-operating means." In the Lamb patent "means for operating the by-pass valve from normal position in either direction so as to control such valve inversely to the control of the water-gate" are found in bar 24, link 23, double lever 20, link 21, lever 18 and stem 12, connected to valve

9 and by-pass valve nozzle 8, the arrangement of the levers being such that as the water-gate opens the by-pass gate closes, and vice versa.

“Means for returning the by-pass valve to normal position on completion of governing movement of the water-gate-operating means” is found in the speed-sensitive element in the governor operating through the rod 25, bar 24, link 23, double lever 20, link 21, lever 18 and stem 12.

Q. 57. I now call your attention to Defendant’s Exhibit Swiss Patent and Defendant’s Exhibit Translation of Swiss Patent, and ask you to state whether you have examined the same and whether you understand the devices and structures therein disclosed and described.

Mr. Blakeslee: All of the objections heretofore registered with respect to this purported Swiss patent and purported translation thereof are repeated, and will be considered as repeated with respect to any questions asked this or any other witness relating to these exhibits, and the particular objection is registered that these purported exhibits do not come within the pleadings in this case.

A. I have read Defendant’s Exhibit Translation of Swiss Patent and I have studied the drawing in Defendant’s Exhibit Swiss Patent and understand the mechanism and its operation.

Q. 58. By Mr. Westall: Will you please describe the device shown and illustrated in the two exhibits referred to in your last answer, stating in full the operation thereof, and giving your reasons for any opinions you may express?

A. Defendant's Exhibit Swiss Patent and Defendant's Exhibit Translation of Swiss Patent show and describe a water-wheel placed within a housing supplied by water through a conduit a, having a driving aperture b, controllable as to area by means of a tongue d, a bypass aperture c controlled by the valve g. The movements of the tongue d are controlled by a differential piston composed, on the lower end of the tongue d itself, of the rod e and the piston f. This differential piston is subject to water pressure on its lower face through the water flowing through the aperture b, and on its upper face by means of water introduced into the chamber as through the pipe B controlled by the valve n, supply being obtained at a', and outlet placed on the conduit a. The action of this differential piston is as follows: the proportions are so made that a balance is obtained between the counteracting forces when the pressure in the chamber o stands at a certain point. On increase of this pressure in chamber o the piston will descend, thereby closing or partially closing the aperture b. On the other hand, a decrease in pressure in chamber o permits the counteracting pressure on the tongue d to raise this differential piston, thereby opening or increasing the area of the aperture b. The control of the aperture in chamber o is by means of the valve n moved by the fly-ball governor in response to speed changes. This action of the valve n is relative to the amount of leakage permitted in the chamber o through the small hole r shown in figure 4, which communicates with the channel s and to the tailrace through aperture t controlled by the threaded valve q. This threaded valve q is adjustable and is

so set that the leakage through it will counteract the flow past the valve *n* when the governor is in a position set by the load at any particular time. The governor is of the fly-ball type, operating the floating lever connected to the stem *f2* forming part of the piston *f*. The object of this floating lever is to counteract the effects on the valve *n* of the moving collar of the fly-ball governor. The by-pass aperture *c* is controlled by the valve *g*, which is connected by the bell-crank *h* to the links *i* and the cross-bar *P*. This cross-bar *P* is attached to the lower end of a piston *k* placed partly within the differential piston before mentioned. Within the small interior of piston *k* is a spring *l*, having its lower seat on the projection *e'* forming a part of the stem *e*, and pressing upward on the piston *k*. The operation of this spring if not counteracted would be to raise the piston *k*, the cross-bar *P*, moving the links *i*, bell-branks *h*, and tending to close the valve *g* covering the by-pass aperture *c*. Opposed to this spring tension, there is water under pressure supplied to the chamber *p*. Chamber *p* as shown in figure 4 communicates by an aperture *s'* to the channel *s* and to the tailrace through this aperture *t* controlled by the threaded valve *q*. The various parts of this mechanism are so designed that when the pressure in the chamber *o* increases there will be no corresponding increase in pressure in the chamber *p*, the result being that as the piston *f* descends, closing the aperture *b*, the piston *k* will descend with it, thereby opening the by-pass aperture *c* in proportion to the closing action of the main aperture. At the close of a governor action leakage through the aperture *t* in figure 4 will permit

the tension in spring 1 to prevail over the pressure in the chamber p, thereby closing the by-pass aperture c. The device shown in figure 5 and figure 4 is a variable control of the aperture t shown in figure 4, which is operated as the differential piston moves down or up. The object of this device is to compensate for the varying pressures under the tongue d at various degrees of opening the aperture b, this variation of pressure being caused by varying rate of flow through the said aperture.

Q. 59. Referring now to Complainant's Exhibit HH, the Lyndon patent in suit, I will ask you to compare the device shown and disclosed in the Swiss patent, to which you have referred in your last answer, with that shown and illustrated in the said Lyndon patent, stating fully your opinion as to the operation of the said devices and giving your reasons in full for any opinions you may express.

A. The Lyndon patent in suit No. 695220 shows a water-wheel casing, a water conduit, a by-pass connected to said conduit, a valve for controlling said by-pass, means for operating the water-gates in one direction or the other responsive to speed changes of the control mechanism, means for operating the said by-pass in a reverse direction to that of the water-gate, and means for returning the said by-pass valve to normal position ready for succeeding action. In the Swiss patent we find the water-wheel casing with its wheel, the water conduit a, by-pass c, by-pass valve g, "means for operating water-gate in either direction" in the piston f, means for operating the by-pass valve g in a reverse direction in the piston k, and "means for returning the by-pass valve

to its normal position ready for subsequent action" in the spring 1, operating on the piston k by reason of over-coming pressure in chamber p.

Q. 60. Without any regard for water economy, assuming that the by-pass of the Lyndon patent were made sufficiently large to take care of any possible variations, and disregarding defects in the mechanism which you have stated would make the device impracticable, please state what, if any, result or effect to be desired in water-wheel government would be accomplished in the Lyndon device which would not be accomplished in the Swiss patent which you have been testifying about.

Mr. Blakeslee: Objected to as calling for a conclusion, and not the proper method of proof, and suggestive and leading.

A. Disregarding the question of water economy the objects of these two devices would be practically the same; that of permitting government of the water-wheel.

Q. 61. By Mr. Westall: Still, with the assumption of my preceding question, would there be any result or effect to be desired that would be accomplished by Lyndon which would not be accomplished in the Swiss patent referred to?

Mr. Blakeslee: The same objection.

A. Under the same assumptions made previously, the results accomplished would be identical.

Q. 62. By Mr. Westall: Please state whether or not you find in the Swiss patent referred to "the combination with means for operating the water-gate in either direction, a by-pass for the water-wheel, and valve controlling said by-pass, or means connected to the water-

gate-operating means and operating the by-pass valve inversely to the operation of the water-gate," and, if so, please point out in said Swiss patent the elements referred to.

Mr. Blakeslee: Objected to as leading and suggestive and as constructing an arbitrary standard of comparison not for the purpose of comparing structures or embodiments as such, and, therefore, not the proper method of proof.

A. I find in the Swiss patent mentioned means for operating the water-gate in either direction shown by the differential piston composed of the tongue d, the stem e and the piston f; "a by-pass for the water-wheel and a valve controlling said by-pass" are found at c and g; "of means connected to water-gate-operating means to operate by-pass valve inversely to the operation of the water-gate," are found in the piston k with its related parts, cross-bar P, links i, and double lever h. The arrangement of these parts is such that when the main gate b is closed by the tongue d, a proportionate action takes place in the by-pass valve g and in the reverse direction.

Q. 63. By Mr. Westall: Please now compare the device of the Swiss patent referred to with the combination of elements and devices described in Claim 7 of the Lyndon patent in suit.

Mr. Blakeslee: Objected to in so far as it involves an interpretation of the patent or that part thereof being Claim 7 of the patent in suit, and, therefore, calling for a conclusion on the part of the witness.

A. Claim 7 of the Lyndon patent reads: "In a water-

wheel governor the combination with means for operating the water-gate in either direction from normal position." In the Swiss patent these features are found in the differential piston composed of the parts d, stem e and piston f.

"A by-pass for the water-wheel, and a valve for such by-pass." In the Swiss patent we find this by-pass at c and the valve controlling it at g.

"Of means connected to the water-gate-operating means and adapted to operate the by-pass valve from normal position in either direction, so as to control such valve inversely to the control of the water-gate during the governing action of the water-gate." In the Swiss patent the means for operating the by-pass valve from normal position is found in the piston k with its related spring l, the tension of which is counteracted by the pressure in chamber p. The arrangement of such parts is such that as the gate-operating-means moves to close the main wheel aperture, the by-pass valve b moves proportionately to open the by-pass aperture c. Reversely, when the piston k moves upward to open the aperture b, the piston k by reason of the tension of the spring l will close the by-pass valve g in proportion to the opening action of the main valve. This latter action takes place when the opening action of the main gate finds the by-pass valve in an open or partly open condition.

"And means for returning the by-pass valve to normal position on completion of governing movement of the water-gate-operating means." Such means in the Swiss patent are found in the leakage of water through the small aperture t slowly permitting a reduction of

pressure in the chamber p, allowing the tension of the spring 1 to overcome the pressure in chamber p, thereby allowing the by-pass valve to return to its normal position.

Q. 64. By Mr. Westall: I now call your attention to Defendant's Exhibit French Patent and Defendant's Exhibit Translation of French Patent, and ask you whether you have examined the same and whether you understand the devices therein shown and described.

Mr. Blakeslee : Each and every one of the objections heretofore registered against the offer of these exhibits is repeated, and likewise objections heretofore made against the consideration of these exhibits are repeated, and such objections will be understood as urged without specific repetition against any consideration of the same by any witnesses.

A. I have read Defendant's Exhibit Translation of French Patent and studied the drawings connected with Defendant's Exhibit French Patent, and understand the operation of the mechanism therein shown.

Q. 65. By Mr. Westall: Will you please describe the mechanism and its operation, referred to in the French patent and the translation thereof which has been placed before you?

A. The French patent mentioned shows a by-pass conduit a, described as being connected to the conduit supplying water to the water-wheel; a by-pass valve b constituting the lower end of the differential piston subject to pressure on its smallest surface due to the water in conduit a, and to pressure on its upper surface from water disposed through the channel g placed within said

differential piston; the channel g is provided with a small aperture at its lower end, is open at times to atmospheric pressure at the top and communicates with the chamber above the differential piston through the apertures h. The upper end of the channel g is during the greater part of the time covered by the valve i, forming part of the cylinder k. Within this cylinder is the piston 1 provided with a small passage n and a larger passage m. Passing through this piston is the rod p, provided on its lower end with a valve o arranged to close the aperture m and having a collar located a short distance above the upper surface of the piston 1. Describing first the operation of this portion of the device shown in the patent, and considering the position of the various parts as shown in the drawing, we find that the passage of pressure water from conduit a to the channel g and aperture h into the chamber above the differential piston has overcome the pressure in the lower end of the said differential piston, causing the by-pass valve forming the lower end of the piston b to be closed. The superior pressure above the differential piston is permitted because of the fact that the valve i has closed the outlet channel g. The weight of the cylinder k tends to keep this valve i in its closed position. On a movement of the piston 1 upward through the governor action, the passage of oil through the small aperture n being restricted, the cylinder k is lifted, thereby opening the valve i and permitting the escape of the pressure of water from the chamber above the differential piston. This so decreases the pressure at that point that the pressure below the differential piston causes that piston to rise and thereby open the

by-pass valve, the water discharging through the conduit c. Should the rod b descend, due to governing action, the valve o, by opening the aperture m, permits a much freer flow of oil through the piston and casing to result as far as cylinder k is concerned. The arrangement of apertures through the piston 1 are so designed in proportion to the viscosity of the oil and weight of the cylinder k that on completion of governing action when the piston 1 stops in its movement, the cylinder k slowly descends, closing the valve i and permitting an accumulation of pressure above the differential piston, thereby closing the by-pass valve. Should this differential piston tend to close more rapidly than the cylinder k can move, the valve i opens slightly and the movement of the differential piston is returned. The gate control and operating means consists of the fly-wheel governor, floating lever uu, the rod connecting this lever to the valve t which admits pressure fluid on the upper or lower side of the piston s in the cylinder r. The movement of this piston through the rod v imparts motion to the lever x which is connected to the water-gates in any convenient manner. Connected to the upper part of the piston v is a double lever w fulcrumed to a fixed part located on the cylinder r and carrying a link connection to the double floating lever uu. The object of this floating mechanism is that the movement of the piston s will tend to counteract the action of the governor on the valve t, tending to return said valve to its closed position. Also connected with the upper end of the piston rod v is a double lever j j fulcrumed to a fixed part at z, and connected at its other end to the rod p. The operation of this gov-

erning mechanism is as follows: on decreased load being applied to the wheel the speed increases somewhat and the fly-balls raise the collar placed below them, depressing the valve t through the floating lever u u and admitting pressure fluid on the upper side of the piston s in the cylinder, which piston, descending through its connections to the water-gates, closes them partly or completely as called for by the action of the governor. This descending movement of the piston s through the lever j j and the rod p lifts the piston l and with it the cylinder k, opening the valve i and permitting the escape of pressure water from the upper side of the differential piston b and causing the by-pass valve to open from the excess pressure now existing below the differential piston. This by-pass valve will open proportionately to the closing movement of the main water-gates. On the completion of governing action, when the piston l becomes stationary, the slow passage of oil through the small aperture n will permit the cylinder k to descend slowly, thereby permitting an accumulation of pressure above the differential piston and closing the by-pass valve.

April 30, 1914, A. M.

It is stipulated by and between the parties, through their respective solicitors and counsel, that Complainant's Exhibit HH may be withdrawn from the exhibits on record in this case and returned to the possession and control of complainant, and that Complainant's Exhibits A and B may be used in substitution therefore with the full force and effect of said Complainant's Exhibit

HH and for all purposes for which said Complainant's Exhibit HH has been or might have been used.

It is similarly stipulated that Complainant's Exhibit GG may be withdrawn from the exhibits of complainant in this case, and returned to the control and possession of complainant, and that the copy of this exhibit, or the agreement constituting this exhibit, as spread upon the record of complainant in this case, may be used and considered for all purposes in this case with the same force and effect as said Complainant's Exhibit GG may be or has been or might be used, taken together with the testimony of any witnesses produced in this case.

At any time prior to final hearing of this action at which counsel for defendant will signify a desire to compare Complainant's Exhibit GG with the copy thereof spread upon the record, the same will be produced by complainant's counsel for that purpose, and upon such comparison any corrections found necessary may be made in the copy spread upon the record so that the copy and such exhibit shall exactly agree, and the copy on the record shall be understood to be such true copy in all aspects of this case.

It is the purpose of these stipulations to in no manner alter the record in this case or the force and effect of any of the record by the withdrawal of these exhibits, and it is understood that the force and effect of the record shall be unaltered and unimpaired by such withdrawal. Wherever reference has been made in the record to either one of these exhibits, HH and GG, it is to be understood that the substitutions made by this stipulation are to affect and control any such past or any future refer-

ence to such withdrawn exhibits, to the end that the substitution may be complete.

S. L. BERRY, recalled. Direct examination resumed:

Q. 66. By Mr. Westall: I will ask you now to compare the device shown and disclosed in Defendant's Exhibit French Patent and Defendant's Exhibit Translation of French Patent with the device shown and disclosed in the Lyndon patent in suit.

A. The Lyndon patent in suit, No. 695220, discloses a water-wheel supplied with water through a conduit, a by-pass connected to said conduit, a valve controlling said by-pass, means for operating the water-gate in either direction, means for reversely operating the by-pass valve, means for returning the by-pass valve to normal position at completion of governing action. The mechanism shown in Defendant's Exhibit Translation of French Patent and in Defendant's Exhibit French Patent implies the existence of this water-wheel and conduit, but does not show them. The by-pass is shown at a and the connection at c; the valve controlling said by-pass is the lower end of the differential piston b; means for operating the water-gates in either direction is shown in the piston c placed within the cylinder r, the movement of which is controlled by the valve t and operating through the piston rod b, lever x and other necessary connections, the water-gates in either direction. The term "either direction" in both of these patents necessarily means "in both directions," inasmuch as an interpretation of the word "either" which allows a choice of one direction only would make the mechanism inopera-

tive as a controlling means for the water-wheel, it being evident that to control the wheel for increasing and decreasing loads these gates must be capable of operation in both directions. Means for operating the by-pass valve in a reverse direction to that of the main water-gate, are found in the combination of parts whereby the piston I responds to the movement of the piston s, controlling the movement of the differential piston reversely to the movement of the water-gate. I find, however, this distinction between the two devices: the arrangement of parts in the French patent is such that at the conclusion of a governing action, at which time the piston I becomes stationary, the weight of the cylinder k acting to force the oil slowly through the small aperture n permits said cylinder k to slowly descend and keeps the valve i closed, thus allowing the accumulation of pressure on the upper surface of the differential piston b which accumulated pressure overcomes that acting upward on the lower face of the differential piston b, permitting the differential piston b to descend, thereby closing the by-pass valve. The distinction between the two devices rests in the fact that in the Lyndon mechanism the by-pass valve returns to half-open position to be ready for succeeding action, which it is capable of performing in both directions, as demanded by the movement of the main gates; whereas, in the French patent at the conclusion of governing action the by-pass valve returns to a closed position and is thereby ready for action only in opening direction. Provision has been made in the large aperture m through the piston l uncovered by the valve o on an upward movement of the piston s, which

movement opens the main water-gates, so that the piston l can move freely through the oil in the cylinder k, and thereby impart no motion to the said cylinder k. In short, this device responds in reverse direction only when the water-gates are closed or partly closed.

Q. 67. Do you mean by "closed or partly closed" "being closed or partly closed"?

Mr. Blakeslee: Objected to as leading. Let the witness answer questions in his own language without suggestion. The meaning speaks for itself.

A. By the words "being closed or partly closed" I mean the operation of moving the gates toward closed position.

Q. 68. By Mr. Westall: I will now ask you to compare the device shown and disclosed in Complainant's Exhibit French Patent and Complainant's Exhibit Translation of French Patent with the device described Claim 6 of the Lyndon patent in suit.

Mr. Blakeslee: Objected to in so far as it calls for a conclusion on the part of the witness, in that it requires an interpretation of the Lyndon patent in suit or that portion thereof within the metes and bounds of the claim mentioned, and as not the proper method of proof.

A. Claim 6 of the Lyndon patent No. 695220 reads: "In a water-wheel governor, the combination with means for operating the water-gate in either direction." In the French patent shown in Defendant's Exhibit Translation of French Patent and in Defendant's Exhibit French Patent, such means are found in the pistons placed within the cylinder r, controlled in its move-

ments upward and downward by the valve *t*, as the result of the control exercised by the speed-sensitive fly-ball governor, the construction being such that on an increase of speed following a decrease of load the said piston *s* is moved in a downward direction, thereby closing the water-gates; and, reversely, on a decrease of speed consequent on an increase of load, the action of the fly-ball governor raises the piston *s* through the connecting movements, thereby closing the water-gates.

“A by-pass for the water-wheel, and a valve controlling said by-pass.” In the French patent such parts are found in the conduit *a* and in the discharging conduit *c*. “and a valve controlling said by-pass” is found at the lower end of the differential piston *b*.

“Of means connected to the water-gate-operating means and operating the by-pass valve inversely to the operation of the water-gate.” Such means in the French patent are found in the combination of the double lever *j* connected to the upper end of the piston rod *v* moving the rod *p*, the piston *l*, the cylinder *k*, which controls the valve *i*, controlling the pressure in the chamber above the differential piston *b*. The combination of parts is such that following a closing action of the main water-gates consequent upon descending movement of the piston *s*, this cylinder *k* is raised, opening valve *i*, permitting the escape of water from the chamber above the piston *b*, thus allowing pressure below the differential piston *b* to overcome that above it, and thus open the by-pass valve. This reverse direction relative to an opening of the main gates is normally not present, due to the fact that the by-pass valve *b* is closed.

Q. 69. By Mr. Westall: I will now ask you to make the same comparison as to the combination of elements described in Claim 7 of the Lyndon patent in suit.

A. Claim 7 of the Lyndon patent in suit, No. 695220, reads: "In a water-wheel governor, the combination with means for operating the water-gate in either direction from normal position." In the French patent such means are found in piston s placed within the cylinder r, supplied with pressure fluid through the valve t, said valve t being responsive to variations of a speed-sensitive fly-ball governor shown. The arrangement of parts is such that on an increase of speed following a decrease of load the collar placed below the fly-balls is raised, thus depressing valve t and admitting pressure fluid on the upper side of the piston s, forcing said piston s downward and by means of appropriate connections closing the water-gates. Upon a decrease of speed following an increase of load, the collar below the fly-balls is depressed, thereby raising the valve t, admitting pressure fluid to the under side of the piston s, raising said piston s and thereby opening the main water-gates.

"A by-pass for the water-wheel, and a valve for such by-pass." "A by-pass" is found in the conduit a in connection with the conduit c, and "a valve for such by-pass" is found at the lower end of the differential piston b.

"Of means connected to the water-gate-operating means and adapted to operate the by-pass valve from normal position in either direction, so as to control such valve inversely to the control of the water-gate, during the governing action of the water-gate." In the French

patent such means are connected to the water-gate-operating mechanism at the upper end of the piston rod v and consisting of the double lever j j, rod p, piston l, cylinder k, valve i, controlling the pressure in the chamber above the differential piston b. The arrangement of parts is such that on a descending movement of the piston s which closes the main water-gates, the piston l is raised and, on account of the small size of the aperture n, the cylinder k will be raised, thereby opening the valve i and permitting the escape of water from the chamber above the differential piston b and allowing the pressure below the differential piston b to prevail over that above it and resulting in an opening action of the by-pass valve. Normally the reverse action of the by-pass valve, consequent upon an opening action of the main gates, does not take place, for the reason that at the conclusion of the governing action the by-pass valve slowly closes. As a result, the arrangement of parts which permits a slow leakage of oil through the aperture n, allowing the weighted cylinder k to descend, thereby keeping the valve i closed, permits the accumulation of pressure above the differential piston b, thus causing pressure above the differential piston to prevail over that below it, and close the valve.

“And means for returning the by-pass valve to normal position on completion of governing movement of the water-gate-operating means.” In the French patent such means are found in the arrangement of parts before described, by which, on completion of the governing action when the piston l becomes stationary, the weight of the cylinder k will force the oil slowly through

the aperture n, permitting the cylinder k to descend, closing valve i, permitting the accumulation of pressure in the chamber above the differential piston, which, prevailing over that below said piston, will close the by-pass valve.

Q. 70. Prior to the date of the Lyndon application, namely, September 13, 1900, have you ever seen or known of an apparatus embodying a governor construction combined with the water-gate and by-pass, wherein the by-pass and water-gate under the control of the governor operated inversely, each with respect to the other?

Mr. Blakeslee: Objected to as leading and suggestive, and calling for a conclusion on the part of the witness, and that no foundation is laid.

Mr. Westall: Counsel for the defendant points out that this is the identical question asked by complainant in leading up to the question of infringement; and, if the question is leading now, it must have been leading then.

Mr. Blakeslee: All right. Counsel remembers that, and counsel has been reminded once before of that, and the objections I believe control in this case. They might possibly have controlled in the other case if they had been put, although we do not concede that.

A. During the years 1895 and 1896 and part of 1897 I was employed by a company engaged in the construction of Girard Water Wheels, and a type of governor which may be called a transmitting dynamometer governor. A combination of these parts was made and installed on the American River in the early months of the year 1896, and it was found that the action of the

governor was so rapid that the inertia effects of the pipe-line were so severe as to nullify any attempt at governing. Being present at that plant, the idea occurred to me that a complete remedy would be found by the use of a by-pass valve inserted ahead of the main water-gates, arranged to be moved by some mechanism which moved the water-gates, having the same capacity as the water-gates, and moved in an inverse direction. Such a device was constructed and installed, and found to solve completely the problem presented. Later, in the year 1896, a similar mechanism was designed for a plant in the southern part of the state and was installed on the Kern River a few miles from the town of Bakersfield. In this installation each unit consisted of two Girard water wheels, each having seven contractible nozzles operated by the hydraulic cylinder under the control of the governor and moving inversely to the movement of the water-gates and a by-pass valve which was placed within the by-pass conduit connected to the main conduit ahead of the water-wheel gates. The action of the governor in this plant was likewise very rapid, and the by-pass valve, inasmuch as it discharged whatever amount of water was cut off from the water-wheels and prevented any change in velocity and pressure in the main conduit, thus permitted the action of the governor to be as rapid as it was desired to be, without any disturbance in the conduit. The device provided for a constant flow in the main conduit at all times in the operation of the unit.

Mr. Blakeslee: We move that this answer be stricken from the record and withheld from consideration on the

grounds of the objection made to the question, and on the further specific ground that the matters testified about do not come within the pleadings in this case, assuming that such matters are produced or attempted to be brought into the case for the purpose of anticipating or limiting the construction of the Lyndon patent in suit, and on the particular ground that the answer interposed by the defendant does not give notice of any such defenses; and on the further ground that the testimony attempted to be given is not the best evidence, and no foundation has been laid for the introduction of secondary evidence. These same objections will be considered as repeated to all testimony directed to such matters touched upon in the preceding answer.

Q. 71. By Mr. Westall: Please state the circumstances leading to your knowledge of the constructions and installations which you have described.

A. I am thoroughly acquainted with the circumstances connected with the plants mentioned, inasmuch as I made all the drawings for both plants, and devised the by-pass valve to cure a very evident defect. I was present and supervised the construction of all the patterns, and was present and witnessed the construction of all parts in the machine shop, and was present in both plants after installation and witnessed the operation of the machinery.

Q. 72. Please state more particularly by whom and where the first installation you have spoken of was put in use.

A. The first installation was designed and constructed by the Girard Water Wheel Company and sold to

the Mammoth Bar Mining Company, operating a placer mine on the American River, a few miles from the town of Auburn, California.

Q. 73. Was the Mammoth Bar Mining Company a corporation?

A. I have no knowledge of the constitution of the company. That was the name under which it was known at that time.

Q. 74. What was your connection with the work at that time, if any?

A. I was draughtsman in the office of the Girard Water Wheel Company.

Q. 75. Who were the managers or officers or those in charge of the work of installation?

A. The officers of the Girard Water Wheel Company known to me were C. B. Sessions, whose position I believe was that of general manager, but whose exact title I do not remember now, and B. C. Van Emon, who occupied the position of superintendent, although I do not now recollect whether that was his exact title or not. The installation was made under the direction of Mr. Van Emon.

Q. 76. Still referring to the same installation at the Mammoth Bar Mining Company, state whether or not that device that you have described was practically used in the working of that mine.

Mr. Blakeslee: Objected to as calling for a conclusion and not the proper method of proof. Let the witness state what was done, if he knows.

A. The device was specially designed to correct an evident fault in the machinery in that plant, and was

successfully used, to my personal knowledge, during the time I was present. It was a complete cure.

Q. 77. By Mr. Westall: With regard to the maintenance of constant head of water, what have you to say as to the operation of that plant at the Mammoth Bar Mining Company?

A. The mechanism employed at the plant of the Mammoth Bar Mining Company, by reason of the fact that the by-pass discharged whatever amount of water was rejected by the wheel, preserved at all times a steady flow through the conduit, which necessarily results in a constant pressure within the conduit, disturbances of head being the result of disturbances of the flow.

Q. 78. To what extent did you have an opportunity of observing the actual use and operation of the device which you have described as being installed at the Mammoth Bar Mining Company?

A. I was present at the plant for a short time only, and can not speak beyond that time.

Q. 79. During the opportunity which you had for observing the plant, state whether or not the device which you have described was in operation.

Mr. Blakeslee: Objected to as leading and calling for a conclusion.

A. The device was in operation and performed the functions perfectly.

Q. 80. By Mr. Westall: As to the second installation which you have spoken of, please state where and by whom, and the circumstances within your knowledge of that installation, stating fully your connection, if any, with the work of designing or installation.

A. The plant installed on the Kern River near Bakersfield was designed and constructed by the Girard Water Wheel Company, and sold to the company known at that time as the Power Development Company, and installed on the Kern River. At that time I was employed as draughtsman by the Girard Water Wheel Company, made all the drawings for the plant, was present and supervised the construction of all patterns for the machinery, was present and witnessed the construction of all parts in the machine shop, visited the plant after installation, witnessed the operation of the devices, and was present during part of the tests made on the equipment.

Q. 81. Who were the officers or managers or persons under whose direction the device you have described as having been used by the Power Development Company at Bakersfield in 1896, who had charge or superintendence of the work?

A. The work was under the general control of Mr. C. B. Sessions, and more particularly under the control of Mr. B. C. Van Emon.

Q. 82. Who were the officers or directors of the Power Development Company, if you know, at the time?

A. The only officer connected with that company known to me was Mr. C. M. Beal, who occupied, as I remember, the position of manager, although that may not have been his correct title.

Q. 83. Who, if anyone besides yourself, assisted in the installation and designing or superintendence of any part of the work of installation?

A. The work was particularly under the direction

of Mr. B. C. Van Emon, but all drawings were made by me, including the calculations for the governor, and the design and details of the various parts of the machinery.

Q. 84. State whether or not the Power Development Company had a consulting engineer, or anyone to whom they were, to your knowledge, in the laying out or work of installation in any particular referring?

A. The hydraulic and mechanical engineering on the part of the Power Development Company was done by Mr. Edward S. Cobb.

Q. 85. Were you acquainted with Mr. Cobb at that time?

A. I was personally acquainted with him; yes.

Q. 86. State whether or not Mr. Cobb had anything to do with the drawings that were made at that time.

Mr. Blakeslee: Objected to as leading. Let the witness testify anything about Cobb that he may know.

A. Mr. Cobb examined the drawings and passed upon them as to the mechanical sufficiency and strength of parts, and so forth.

Q. 87. By Mr. Westall: Will you please describe as fully as you can, without reference to any drawings or exhibits in the case, the devices in use at the Bakersfield plant to which you have referred, by the Power Development Company in 1896, for the government of water-wheels, describing generally the associated parts that may be necessary to make clear your answer.

Mr. Blakeslee: Objected to as predicated upon a conclusion that the devices in this plant were used for governing purposes.

A. The plant designed and built by the Girard Water Wheel Company and installed on the Kern River near Bakersfield consisted of two units, each of which consisted of two Girard water-wheels fastened to one shaft, supplied with water through a branched conduit, at the end of each branch there being placed seven discharge nozzles made contractible by having one face of the rectangular opening moveable. These valves formed part of the valve stems which projected through the water-wheel housing, and were operated by means of levers, links, etc., by a hydraulic cylinder, the balance valve of which was responsive to the action of the governor. Each unit was used to drive an electric generator placed in line therewith, and connected to the various parts of a transmission dynamometer governor. This governor consisted of various levers, links, springs, etc., so designed and constructed that the centrifugal force resulting from the revolution of the governor was opposed by the effort made to drive the generator in part, and in part by the tension of certain springs. The movements of the levers of this governor were carried through links, bell-cranks and a sliding collar, a double lever, a rod, a bell-crank and link and a floating lever operating the balanced valve of the hydraulic cylinder before mentioned. The nature of the governor was such that it was responsive to both load changes and speed changes, making it a compound governor in this sense. Connected by linkage to the end of the piston rod of the hydraulic cylinder before mentioned was a lever attached to the stem of a large plug valve placed in the conduit connecting the main water conduit to the tail-

race at a point ahead of the main water-gates. This large plug valve was so designed and arranged as to have a discharge capacity when full open equal to the discharge capacity of the 14 nozzles on the wheels of the unit when they were full opened, and it was so connected to the cylinder that as this cylinder moved to close the main water-gates this plug valve was proportionately opened, and vice versa.

April 30, 1914. P. M.

Q. 88. By Mr. Westall: Referring to the construction which you have described as having been installed at Bakersfield by the Power Development Company in 1896, please state when and how long to your knowledge that device was operated.

Mr. Blakeslee: Objected to as assuming a conclusion, namely, that the device was operated.

A. I had no occasion to visit the plant after the tests before referred to, and cannot say how long the device was in use.

Q. 89. By Mr. Westall: When were the tests to which you have referred made?

A. They were made in the summer of 1897.

Q. 90. Please state when the device at Bakersfield was first set in operation for testing.

A. I have no record of the exact date except that it was in the hot season.

Q. 91. During what year?

A. 1897.

Q. 92. And for how long a time did you have an opportunity of observing the operation?

Mr. Blakeslee: The same objection.

*St. Berny recalled direct
examination resumed*

A. I was in the plant for about one month during the latter part of which the plant was in operation, probably about two weeks.

Q. 93. By Mr. Westall: Please state in a general way the result of the tests that were made as to the governing mechanism.

A. I have no records of the exact figures obtained in the governor test, but the results were perfectly satisfactory and well within the guaranty.

Q. 94. I now place before you a photograph showing the interior, apparently, of a power plant, and ask you to state if you know what that represents.

A. The photograph which I hold in my hand represents the general interior view of the power plant designed and built by the Girard Water Wheel Company and installed on the Kern River near Bakersfield.

Q. 95. By whom?

A. The owners of the plant were the Power Development Company.

Q. 96. State whether or not that is a representation of devices about which you have been testifying as having been in use in 1896 and 1897.

Mr. Blakeslee: Objected to as leading and not the proper method of proof.

A. The photograph shows the water-wheels, governor and by-pass valve designed and installed on the Kern River near Bakersfield.

Q. 97. By Mr. Westall: Do you recognize either of the persons represented in the photograph?

A. The figure on the right is that of the civil engineer of the company. I think his name was MacMurto.

The one on the left in a reclining position is the pipe maker whose name I have forgotten. He was employed by a Los Angeles concern to install the pipe-line. The central figure is myself.

Q. 98. Do you recollect the circumstances attending the taking of that photograph?

A. I do not now remember who took it, but it was evidently intended to show the plant, and to satisfy the persons shown therein.

Q. 99. Will you please refer to the marking on the back of the photograph about which you have been testifying and state upon the record what that marking is?

A. I find this photograph is marked "Defendant's Exhibit Interior of Power Development Company's Power House."

Q. 100. Referring now to the letters marked in ink upon the photograph, I will ask you to describe generally by the use of such letters the device that you find represented in the photograph referred to, explaining the functions and operations of the various parts, as far as may be necessary to make your answer clear, and give your reasons for any opinions you may express.

A. A is placed upon the generator which is driven by the water-wheel unit. B is placed upon the fly-wheel forming a part of the transmitting dynamometer governor. The letter C is placed upon the housing of one wheel of the near unit. The letter D is placed upon the housing of the other wheel of the same unit. The letter E marks the hydraulic cylinder used for opening and closing the main stop valve marked F placed in the conduit marked G. H indicates the sliding collar moving

on the water-wheel shaft responsive to changes in position of the governor parts. I indicates the lower end of the double lever operated by the sliding collar H, as well as one end of the rod connected thereto. J indicates the by-pass valve. K indicates the lever attached to the stem of the by-pass valve. L shows the exciter driven by a belt from the fly-wheel B and used to generate current for the fields of the generator A.

Q. 101. Please now look at the blueprint I hand you marked No. 1 in the lower right hand corner, and state if you know what it represents, and, if so, describe generally the device.

A. The blueprint marked No. 1 in the lower right hand corner is a diagrammatic plan view of the hydraulic end of one unit used in the plant near Bakersfield. The small view in the upper lefthand corner represents the slide which was connected to the end of the piston rod, forming part of the gate-operating mechanism together with links and lever. The lever R transmitted motion to the main water-gates; the link U was connected to the by-pass valve. The small view in the upper right-hand corner shows an adjustable lever device which was placed on the stem of the by-pass valve. This shows the link U, before described, as shown in the upper lefthand corner. Referring to the letters marked on this print, the letter B shows the fly-wheel forming part of the governor. C C show the casings of the two water-wheels forming parts of each unit. G shows the main water conduit branch furnishing the supply of water to each wheel. The dotted letter J indicates the position of the by-pass valve placed in the conduits and ahead of

the main water-gates. K indicates the lever connecting the stem of the by-pass valve to the rod U. Connecting rod U transmitted motion from the extension lever R moved by the hydraulic cylinder. H shows a sliding collar moveable along the axis of the water-wheel shaft and responsive to governor changes. I I show the upper ends of a lever fulcrumed approximately midway of its length, and transmitting motion to a rod shown by dotted lines under the center of the water-wheel. M shows a connection of the said rod to a bell-crank which transmitted motion through the link to the floating lever N which controlled the movements of the balanced valve connected to the valve-rod O. P indicates the cylinder which is controlled by said valve and which contained a piston shown by dotted lines which moved responsive to changes of the balanced valve to impart motion to the slide Q, and which by means of the link shown in the small upper lefthand view, connected to the lever R fastened to the sleeve S. This sleeve ^S was concentric with the water-wheel shaft, but did not touch it at any point, being supported on the two housings. The rotation of the sleeve S and levers controlled stems T of the main water-gates.

Q. 102. Please now refer to the marking on the back of the blueprint to which you have been referring and state what you find.

A. I find on the back of this blueprint "Defendant's Exhibit Cobb Blueprint No. 1."

Q. 103. State whether or not the blueprint correctly represents and illustrates the device about which you have been testifying as having been installed at Bakers-

field by the Power Development Company in 1896.

Mr. Blakeslee: Objected to as leading and calling for a conclusion, and not the best evidence, and not the proper method of proof; and it is understood that the objections heretofore urged against any of these exhibits, or any testimony pertaining to the alleged Power Development Company plant, are repeated, without further repetition.

A. The blueprint shown in a diagrammatic manner correctly shows the various features of the water-wheels and controlling parts designed and built by the Girard Water Wheel Company and installed on the Kern River near Bakersfield in the plant owned by the Power Development Company.

Q. 104. By Mr. Westall: Can you produce any drawing, print or other pictorial representation to show more fully the construction of the device about which you have been testifying, namely, that installed by the Power Development Company at Bakersfield in 1896? If so, I will ask you to produce the same.

A. I have made a drawing showing the devices in more complete manner than this print now before me, and have prints here. (Witness produces a blueprint.)

Q. 105. Will you please describe in a general way what is illustrated in the blueprint which you have produced in answer to the last question?

A. This blueprint shows in a diagrammatic manner the various features of the Girard Water Wheel installation designed and constructed by the Girard Water Wheel Company and installed by the Power Development Company on the Kern River near Bakersfield, as before testified to.

Q. 106. Please compare briefly the exhibit to which you have heretofore referred, being Defendant's Exhibit Cobb Blueprint No. 1, with the blueprint which you have just produced and state what differences in the illustration or otherwise you find in the two blueprints.

A. I have looked over these two prints and find that the differences are of minor nature and consist of the following: In the upper lefthand view of Defendant's Exhibit Cobb Blueprint No. 1, the construction shows that the rod U is attached to an extension of the lever R. That is, that it had the connection separate from the connection between the link tying the slide Q to the lever R, whereas in the blueprint which I have just produced this connection is shown as a single pin. This in no way changes the method of operation. The small view in the upper right hand corner of Defendant's Exhibit Cobb Blueprint No. 1 shows that the lever K was attached to the stem of the by-pass valve in a manner permitting adjustment, whereas in the blueprint just produced by me this is shown as a permanent connection. This likewise does not change the method of operation and shows a convenient adjustment which may or may not be required. Otherwise, I find the two prints identical as to the parts they show.

Q. 107. In comparing the blueprint which you have last produced, state what sources of information you consulted in illustrating the device there shown.

A. In preparing the tracing from which this blueprint just produced by me was made, my main dependence was upon memory. I had when preparing this a blueprint showing some general dimensions of certain

parts of this plant used in some of the succeeding work. This blueprint, however, contains none of the principles shown here, serving solely for some general dimensions. I had also seen some of the old cuts published illustrating this plant. But, as I testified before, my dependence for the principles involved herein has been upon the knowledge which produced certain elements of this mechanism in the first place, and upon memory of the execution of all the detail drawings for this plant. The drawings from which these parts were made were made originally entirely by myself.

Q. 108. Please state whether or not in preparing the tracing referred to you had before you a copy or the original of Defendant's Exhibit Cobb Blueprint No. 1?

A. The tracing from which the blueprint was made which I have just produced was completed several weeks before I had seen the original or a copy of Defendant's Exhibit Cobb Blueprint No. 1. The discrepancies shown between these two prints bear out this statement.

Mr. Westall: Counsel for defendant offers in evidence the blueprint identified and referred to by the witness, and asks that the same be received in evidence and marked "Defendant's Exhibit Berry Blueprint No. 1."

Mr. Blakeslee: We object to the offer of this exhibit as not the best evidence and we couple that objection with the suggestion to counsel that in some manner he explain why the absence of the original drawings from which the features of this installation were constructed has not been accounted for.

(The said blueprint so offered in evidence is thereupon marked by the Examiner "Defendant's Exhibit

Berry Blueprint No. 1," together with the title of the court and cause and the date upon which the said blueprint was offered in evidence.)

Mr. Westall: Counsel for defendant states that the blueprint just offered in evidence is produced only for the convenience of the court in understanding the testimony of the witness as to what he saw in use at the time about which he is testifying, and it is not introduced in evidence as a substitute for any original drawings or other representations from which the devices at Bakersfield were installed.

Mr. Blakeslee: We therefore renew our objection to this blueprint as not being the best evidence of the things purported to be shown thereby, and call upon counsel to produce the best evidence, namely, the drawings which the witness has testified he made preparatory to the construction and installation of the features and parts of this alleged Bakersfield Power Development Company's plant, or to account for their non-production.

Q. 109. By Mr. Westall. Please state whether or not you have any knowledge as to whether the original drawings prepared by you for the installation at Bakersfield are now in existence.

A. Efforts made to find the original drawings from which the plant at Bakersfield was built resulted in the definite statement by the last owners of said drawings that at the time of the fire of 1906 at San Francisco these drawings, not being in their vault, were destroyed by fire.

Mr. Blakeslee: It is understood that the same objection heretofore registered to the other exhibits purport-

ing to reflect any devices or aspects of the alleged Power Development Company's plant, as not coming within the pleadings in this case, notice of said purported defense not being given to the complainant in the answer, are repeated.

Q. 110. By Mr. Westall: I will ask you now to please explain the device illustrated in Defendant's Exhibit Berry Blueprint No. 1, explaining fully the operation and effect, and the manner in which results are accomplished, stating fully your reasons for any opinion you may express.

A. The blueprint marked "Defendant's Exhibit Berry Blueprint No. 1" shows in figure 1 the construction of a transmitting dynamo-meter governor used in this plant. Referring to figure 1, 1 represents the fly-wheel which forms part of this governor; 2 2 the levers fulcrumed at 4 4, pulled together by the tension of the springs 5 5, connected by links 6 6 to the double arm lever 7 keyed to the water-wheel shaft 8. The links partly shown and marked 9 9 serve to connect the levers 2 2 to the bell-crank 12 12 shown in figure 3. The arrangement and proportions of the various parts of this governor were so made that the centrifugal force of the levers 2 2 with their weights 3 3 were balanced against the efforts made by the water-wheel shaft 8 to drive the generator which was rigidly connected by means of a flange coupling to the fly-wheel 1, assisted by the tension of the springs 5 5. The relationship of this driving effort and the spring tension was such that as the driving effort decreased the spring tension increased as the result of the outward movement of the levers 2 2. Con-

versely, as the driving effort increased, a proportionate tension was taken from the springs 5 5 by means of the inward movement of the levers 2 2, by which means the opposition of the levers 2 2 was dependent primarily upon the amount of power being transmitted through the mechanism. These oppositions were modified more or less by reason of any deviation of speed from a selected normal. The result of this combination of elements was a governor, compound in nature, responsive to load changes primarily, and to speed changes secondarily.

Referring to figures 2, 3 and 4, the links 9 9 before mentioned as connecting the levers 2 2 to the bell-cranks 12 12, are seen in figure 3. These links transmitted the motion of levers 2 2 to the said bell-cranks 12 12, thereby moving in one direction or the other along water-wheel shaft 8, the sliding collar 13 which imparted its motion to the double lever 14 ful-crumed at 15. At the lower end of lever 14 there was an adjustable connection 16 connecting the lever 14 to the rod 17, through which motion was imparted to the bell-crank 19, the link 20, floating lever 21, link 22, valve stem 23. On this valve stem was secured a balanced valve 24, shown in dotted lines, which controlled the admission of pressure fluid to one end or the other of the cylinder 25, thereby moving the piston 26 in one direction or the other. Attached to piston 26 was piston rod 27 imparting motion to the slide 29, link 30, lever 31, sleeve 32, the multiple links 33 33, having pins 34, surrounded by sliding blocks 35 moving within the jaws of levers 36 which are rigidly attached to stem 37 forming an integral part of the moveable portion 38 of the contractible

nozzle 47. The opposite portion 48 of this contractible nozzle was fixed, the variation in the area of the nozzle being affected by the resisting action of the stem 37 opening or closing the discharge orifice of the nozzle 47. Attached to the link 30 and lever 31 was the link 40, imparting motion to lever 49 secured to stem 42 of the movable element 41 of the by-pass valve 43. Attached to one side of the fly-wheel 1, as shown in figure 3, was a flange connection 10, rigidly attached to the generator shaft 11. It will be seen by the description of this governor that it formed a variable means of connecting the water-wheel shaft 8 to the generator shaft 11, the variation being utilized as a governing means to control the water-wheel gates and the by-pass valve. A A, represented in dotted line, Girard wheels placed within the housings B B. These wheels were keyed rigidly to the shaft 8. 46 represents the main conduit, the flow of water being indicated by the arrows. 44 and 45 show the by-pass conduit used in connection with the by-pass 43.

The operation of this mechanism is as follows: The various parts are shown in such relation that the driving nozzles are full open, the by-pass valve fully closed. On decrease of load, the driving effort decreasing, disturbs the balance in the governor parts, necessitating to restore the balance that the levers 2 2 should move away from the center, adding tension to the springs 5 5 in proportion to the loss of driving effort. This outward movement of the levers 2 2, engaged by the links 9 9, to the bell-cranks 12 12, imparted a motion to the sliding collar 13 toward the fly-wheel and away from the water-wheel A. This direction was reversed by the lever

14, causing the rod 17 to move away from the fly-wheel, which action through the bell-crank 19, link 20, lever 21, link 22, valve stem 23, moved the valve 24 in a direction to admit pressure fluid to the inner side of the piston 26 in the cylinder 25. This piston 26, moving toward the other end of the cylinder, carries the piston rod 26, slide 29, link 30, lever 31, sleeve 32, compound levers 33 33, each having seven pins 34, surrounded by plugs 35, sliding within the jaws of levers 36, which were rigidly attached to the stems 37, forming an integral part of the movable portion 38 of the contractible nozzle 47. The opposite part 48 of the contractible nozzle was fixed. The result of the movement just described was to decrease the area of the discharge nozzles. These nozzles discharged water on the buckets 39, as shown in figure 4 of the wheels A A. This same movement through the link 40, connected to link 30 and lever 31, acting through the lever 49 and the stem 42 of the moving portion 41 of the by-pass valve, opened the same proportionate to the closing movement of the main gates. This by-pass valve was designed to have when full open a discharge capacity equal to the discharge capacity of all the nozzles of the main wheels when full open. On increase of load the operation of the mechanism is directly opposite to that just described, opening the main gates of the water-wheels and closing the by-pass valve proportionately.

The object and result of this construction was to enable a prompt and accurate governing of the amount of power on the wheels, without the disturbance of flow or pressure in the main conduit. This object was fully attained by the plant under discussion. The parts were

so adjusted that when the water-wheel gates were fully opened the by-pass valve was fully closed, and vice versa.

Q. 111. As a governing mechanism, state whether or not the device which you have described attained the object and result aimed at by its designers.

Mr. Blakeslee: Objected to as calling for a conclusion and not for a statement of facts, and not the proper method of proof.

A. The mechanism as installed near Bakersfield attained in the most complete and satisfactory manner the governing action aimed at and exceeded by considerable margin the guaranties made in that connection.

Q. 112. By Mr. Westall: After the first installation, state whether or not any changes in construction or adjustment of the different parts were made, and, if so, state the nature and extent of any changes which were made in the governing device as originally designed and installed.

Mr. Blakeslee: The question is objected to unless it be qualified by calling for the personal knowledge of the witness in these respects.

Q. 113. By Mr. Westall: The question is withdrawn. State whether to your knowledge any changes in adjustment or construction of the different parts were made after the first installation of the device about which you have testified.

A. The only changes made in this mechanism within my personal knowledge resulted from the non-realization of very positive statements to us that the water of the Kern River at that point was entirely clear of grit

or other foreign matter. This assurance to us was of such a nature that we felt justified in operating the balanced valve and hydraulic cylinder from the conduit line. After trial it developed that this water was far from free from such foreign matter, and it became necessary to substitute oil under pressure to the balanced valve 24 and cylinder 25. This was done by driving a forcepump from the water-wheel shaft 8, supplying oil under pressure to the valve 24 and cylinder 25. This same condition of contained grit or sand rendered the operation of the by-pass valve 41, as originally constructed, somewhat difficult. This trouble was remedied by me at the plant by adding to the end of the moving portion 41 of the by-pass valve a support on the center thereof to sustain in part the weight of the said moving portion 41. This change completely obviated any difficulty in this by-pass valve during the time I remained at the plant. A device of this nature if exposed to the flow of water containing sand or grit must necessarily wear, as do all hard substances exposed in like manner. The remedy in this case under conditions involving gritty water would be to make the moving portion 41 somewhat smaller than the bore of the containing portion 43. This condition is one which could be provided by the original manufacturer, and is one which will naturally produce itself in operation.

Q. 114. Please describe more fully the construction of the by-pass valve to which you have referred.

A. The by-pass valve shown on Defendant's Exhibit Berry Blueprint No. 1, consisted of a large plug valve placed within the casing 43, communicating with the dis-

charge conduit 44 45, leading to the tailrace. It communicated at its inlet side of the main conduit 46 at a position at the head of the main water-wheel gates. This valve was operated by a rotary motion on its stem, opening or closing the aperture in accordance.

Q. 115. For the sake of clarity, could you compare the valve referred to with any wellknown device, for the purpose of illustration?

Mr. Blakeslee: Objected to as calling for a conclusion and a comparison with something not before the court.

A. This by-pass valve resembles what is known as the "plug valve" used in plumbing work.

Q. 116. By Mr. Westall: Please state whether or not you are acquainted with the various forms of valves used prior to the date of the Lyndon application, namely, September 13, 1900, and also those that were used prior to the time of the Bakersfield installation in 1896, and, if so, please describe generally the different forms of valves that were in use at that time.

A. You refer to the valves used in water-wheel governing, or valves in general?

Q. 117. Referring particularly to valves used in water-wheel governing mechanisms.

A. Prior to 1900, as far as my personal knowledge goes, valves in most general use in governing water-wheels were what were known as "cut-off", "hoods", "deflecting hoods" and the device shown in this blueprint marked Defendant's Exhibit Berry Blueprint No. 1, showing a contractible rectangular nozzle. Referring to the general question of valves used to control the flow

of water in pipes, there were in common use plug valves, gate valves, globe valves and butterfly valves.

Q. 118. Are you referring now to prior to 1896?

A. The general statement applies to dates previous to 1896.

Q. 119. Please now compare the illustration of Defendant's Exhibit Interior of Power Development Company's Power House with Defendant's Exhibit Berry Blueprint No. 1, pointing out the various parts in the drawing as lettered in the photograph.

A. Following the lettering in the photograph marked Defendant's Exhibit Interior of Power Development Company's Power House, and referring to Defendant's Exhibit Berry Blueprint No. 1, the fly-wheel B of the photograph is shown at l, the casing C D is shown at B B; the balanced cylinder E is not shown on the blueprint, nor is the valve F. The conduit G is shown at 46; the sliding collar H at 13; the lever I at 14; the by-pass J at 43; the by-pass lever K at 49; the exciter L is not shown, nor is the generator A.

Q. 120. Referring now to Complainant's Exhibit A, the Lyndon patent in suit, I will ask you to compare the device therein disclosed with that illustrated in Berry Blueprint No. 1.

A. The Lyndon patent No. 695220 shows a water-wheel, a water conduit, a by-pass and valve controlling said by-pass, means for operating the water-gates in either direction, means for operating the by-pass valve inversely to the water-gates, means for returning the by-pass valve to normal position on completion of governor action. In the device shown in Defendant's Ex-

hibit Berry Blueprint No. 1, I find a water-wheel represented at A A, a conduit at 46, by-pass at 44 45, a valve controlling said by-pass at 41 within the casing 43. Means for operating the water-gates in either direction are found in the moving elements within the governor shown in figure 1, operating through the mechanism before described to close the water-gates on decrease of load and to open them on increase of load. Means for operating the by-pass valve reversely to the water-gates is found in the manner of arranging and connecting the by-pass valve moving portion 41 with relation to the moving portion 38 at the water-gates. "Means for returning the by-pass valve to normal position on completion of governing action." As before described, this governor is compound in nature, responsive to load and speed changes. Means for returning the by-pass valve to normal position on completion of governing action, is found in this speed-sensitive feature of the governor which restores parts to their normal position on return to normal speed.

Q. 121. Please now compare the device shown and illustrated in defendant's exhibit Berry Blueprint No. 1 with the combination in a water-wheel governor with means for operating the water-gate in either direction, a by-pass for the water-wheel and a valve controlling such by-pass, of means connected to the water-gate-operating means and operating the by-pass valve inversely to the operation of the water-gate, and state whether or not you find such combination, pointing out specifically the mechanism which in your opinion corresponds to the

various elements I have mentioned, giving your reasons for any opinions you may express.

Mr. Blakeslee: Objected to as leading and suggestive, and calling for an arbitrary comparison of the exhibit with a formulated mechanical proposition presented by counsel, and not the proper method of proof, and being practically tantamount to an attempt by counsel to testify himself in the case.

A. "In a water-wheel governor, the combination of means for operating the water-gate in either direction." These means are found in the mechanism shown in Defendant's Exhibit Berry Blueprint No. 1 in the movements of the levers 2 2 of the governor, in one direction or the other, responsive to load and speed changes, and operating through the links 9 9, bell-cranks 12 12, sliding collar 13, lever 14, connecting rod 17, bell-crank 19, link 20, lever 21, link 22, valve stem 23, moving balanced valve 24 in accordance with the governor movement, thereby setting in operation piston 26 within the cylinder 25 which, acting through piston rod 27, slide 29, link 30, lever 31, sleeve 32, compound levers 33 33, pins 34, plugs 35, levers 36, stems 37, move the portion 38 of the water-gate toward open or toward closed position, in accordance with the movements of the governor parts.

"A by-pass for the water-wheel and a valve controlling said by-pass." This by-pass is found at 44 45, and the valve controlling said by-pass at 43, containing the moving portion 41.

"Of means connected to the water-gate-operating means and operating the by-pass valve inversely to the operation of the water-gate." These means are found

in the link 40, lever 49, stem 42, forming a portion of the moving part 41 of the by-pass valve, the arrangement of parts being such that when the water-gates are full open the by-pass valve is full closed, and, conversey, when the water-gates are full closed the by-pass valve is full opened, the movements being inverse one to the other.

Q. 122. By Mr. Westall: Please now compare the device illustrated in Defendant's Exhibit Berry Blueprint No. 1 with that described in Claim 7 of the Lyndon patent in suit.

Mr. Blakeslee: Objected to as calling for an arbitrary interpretation of that portion of the Lyndon patent in suit as being within the metes and bounds of said Claim 7, not the proper method of proof, and leading and suggestive.

A. Claim 7 of the Lyndon patent No. 695220 reads: "In a water-wheel governor the combination with means for operating the water-gate in either direction from normal position. In Defendant's Exhibit Berry Blueprint No. 1, these means are found in the movable levers 2 2 of the governor, operating through the links 9 9, bell-crank 12 12, sliding collar 13, lever 14, connecting rod 17, bell-crank 19, link 20, lever 21, link 22, valve stem 23, moving the balanced valve 24 in one direction or the other, responsive to movements of the governor parts. This balanced valve 24 admits pressure fluid to one side or the other of the piston 26 in the cylinder 25, causing it to move either in one direction or the other, and acting through piston rod 27, slide 29, link 30, lever 31, sleeve 32, compound levers 33, pins 34, plugs 35, levers 36, stems, 37, forming an integral part of the movable portion 38

of the water-gates. The arrangement of parts is such that these water-gates are closed by the mechanism upon decrease of load and are opened by an increase of load.

“A by-pass for the water-wheel and a valve for such by-pass.” This by-pass is found at 44 45 and the valve for such by-pass at 41 within the housing 43.

“Of means connected to the water-gate-operating means and adapted to operate the by-pass valve from normal position in either direction so as to control such valve inversely to the control of the water-gate, during the governing action of the water-gate.” Such means are found in the link 40, lever 49, stem 42, forming a portion of the part 41 of the by-pass valve. The arrangement of parts is such that as the water-gates close the by-pass valve opens, and, conversely, as the water-gates open the by-pass valve closes.

“And means for returning the by-pass valve to normal position on completion of governing movement of the water-gate-operating means.” Such means are found in the speed-sensitive feature of the governor working through the connections before described to turn this by-pass valve to normal position on return to normal speed.

Q. 123. By Mr. Westall: I now call your attention to Defendant's Exhibit Journal of Electricity, Vols. 2 and 3, and Defendant's Exhibit Journal of Electricity, Vols. 4 and 5, and ask you to state what those exhibits are.

Mr. Blakeslee: Objected to as not the proper method of proof, the witness not having qualified to identify these purported publications, and as calling for a conclusion.

A. I have examined Defendant's Exhibit Journal of Electricity Vols. 2 and 3, and find it to be volumes 2 and 3 of the Journal of Electricity published by George P. Low as editor, in San Francisco.

I have examined Defendant's Exhibit Journal of Electricity Vols. 4 and 5, and find it to be volumes 4 and 5 of the Journal of Electricity published by George P. Low in San Francisco.

Q. 124. By Mr. Westall: Please state, if you know, when the volumes you have identified were published.

Mr. Blakeslee: Objected to on the same ground as last noted.

A. Volume 2 covered a period from January to June, 1896; volume 3, from July to December, 1896; volume 4 from April to September, 1897, and volume 5, October, 1897, to June, 1898.

Mr. Blakeslee: We ask that the answer be stricken out as not being responsive to the question. The witness has not testified when these volumes were published, but only referred to certain periods covered by them.

Q. 125. By Mr. Westall: Please state the nature, as a publication, of the Journal of Electricity.

Mr. Blakeslee: Objected to as calling for a conclusion, and not the best evidence, the Journals speaking for themselves; and the contents ought to show what it talks about.

A. The Journal of Electricity as published at that time was of a very high order and presented facts connected especially with the electrical industries, including the development and transmission of power, and subjects of like nature.

Q. 126. By Mr. Westall: When did you first become acquainted with the *Journal of Electricity*?

A. I became acquainted with it particularly after my return to California in 1895. I was personally acquainted with the editor, George P. Low, and had numerous conferences with him regarding matters in which he was interested.

Q. 127. By Mr. Westall: To what extent, if you know, was the *Journal of Electricity* known among engineers generally throughout the county at the time of the publication of the volumes to which you have referred?

A. At that time the *Journal of Electricity* was well known and held a high position in the field covered by it.

Q. 128. Among your own circle of acquaintances of engineers, how many engineers were you acquainted with who did not know of the *Journal of Electricity* at the time of the publication of the volumes which you have referred to?

A. I cannot answer the question positively, but, from the nature of the publication at that time and the position it held, the majority or all of the engineers should have been acquainted with it.

Q. 129. Have you had occasion since 1895 to examine or refer to any of the files of the *Journal of Electricity*?

A. I have not had occasion to examine the files published at that time. I have been a subscriber for some time past to the *Journal*.

Q. 130. Referring now to volume 4, being the issue of August, 1897, and referring particularly to the article entitled "The Bakersfield Transmission", I will ask you

to state whether or not you have examined the files of the Journal of Electricity and have ever had occasion to examine that article prior to the time of giving your testimony?

Mr. Blakeslee: All questions directed to the contents of the purported publications, being the Journal of Electricity, so-called, are objected to on the grounds urged against the introduction of the same in evidence, namely, that the same do not come within the pleadings in this case, notice of the same not being given in the answer; and, on the further grounds, that the publication of the purported Journal editions has not been proven, and that the purported Journals are not identified.

A. A few weeks ago I examined in the office of the Journal of Electricity, Power & Gas, volume 4, and examined the article published in the issue of August, 1897, and marked "The Bakersfield Transmission."

Q. 131. By Mr. Westall: Do you find the article in the book now before you—the identical article that you saw in the office of the Journal of Electricity, Power & Gas, at the time you mentioned?

A. This volume contains the same matter contained in the volume in the office of the Journal of Electricity, Power & Gas.

Q. 132. Referring now to voume 4, under date of September, 1897, and particularly the article there headed "Water-wheel Governor," please state whether or not you have ever seen that article before, and, if so, where.

A. I have seen the article marked "Water-wheel Governor" in the issue of September, 1897, in the office of the Journal of Electricity, Power & Gas. I find

that this article contains the same matter shown in that volume.

Q. 133. Referring now to volume 3, No. 1, page 15, of Defendant's Exhibit Vols. 2 and 3, Journal of Electricity, I will ask you to state whether you have ever seen the article on the page mentioned, headed, "Electric Power at Bakersfield", and, if so, under what circumstances and where?

A. I have seen the article marked "Electric Power at Bakersfield", on page 15 of the Journal of Electricity, No. 1, volume 3, in a similar volume at the office of the Journal of Electricity, Power & Gas, in San Francisco. I find this article the same as therein contained.

Q. 134. Taking up the articles which have been specifically inquired about, please state in a general way whether the subject matter of those articles have referred to any device or water-wheel governors which you have mentioned in your previous testimony. If so, state which.

Mr. Blakeslee: Objected to as calling for a conclusion, and an unnecessary interpretation of these articles which speak for themselves.

A. The article marked "Bakersfield Transmission" in the issue of August, 1897, of the Journal of Electricity, Volume 4, forming part of Defendant's Exhibit Journal of Electricity Vols. 4 and 5, shows the features and construction methods of the power plant built at Kern River near Bakersfield by the Power Development Company. This article shows a general view of the plant, exterior and interior, the interior view showing the Girard water-wheels, the governor and by-pass as built by the Girard

Water-Wheel Company, and furnished to the Power Development Company. At page 95 is shown a drawing illustrating the method of construction of the governor. The article marked "Water-wheel Government" in the issue of September, 1897, of the Journal of Electricity, volume 4, forming a part of Defendant's Exhibit Journal of Electricity, Vols. 4 and 5, is in part devoted to a discussion of a governor designed and built by the Girard Water Wheel Company for the Power Development Company, together with the various connecting portions required to connect this governor with the main water-gates and by-pass valves. This article is especially concerned with water-wheel government, and shows the results obtained in the test of the governor there installed.

Q. 135. By Mr. Westall: Please state whether or not in your opinion as an engineer, if the articles to which you have referred in Defendant's Exhibit Journal of Electricity, Vols. 4 and 5, were placed before one skilled in the art of water-wheel government, if he would find therein sufficient information to enable him to build and construct and install a water-wheel with its governor, such as there illustrated and described.

Mr. Blakeslee: Objected to as calling for a conclusion and that the article speaks for itself.

A. I find that in the two articles mentioned as being in Defendant's Exhibit Journal of Electricity, Vols. 4 and 5, they contain sufficient information to enable one skilled in this particular branch of the work to design and construct a mechanism similar in principle, detailed dimensions being, of course, not given.

Q. 136. By Mr. Westall: I now place before you Defendant's Exhibit XX and ask you to state whether you have ever, prior to testifying, seen that exhibit.

A. I have not previously seen this exhibit marked Defendant's Exhibit XX.

Q. 137. Please state what is shown and disclosed and represented in that exhibit, if you know.

A. This Exhibit XX shows a Girard water-wheel with an open case C to the left, a casing to the right marked C covering a similar wheel, the main conduit G, sleeve S placed outside of the water-wheel shaft, bell-crank M, valve stem O, cylinder P, slide Q, lever R, sleeve S, stems T, by-pass valve J, by-pass lever K, by-pass link U, such parts being the mechanism employed at the Bakersfield plant to operate the water-gates and by-pass valve.

Q. 138. Please now compare the Defendant's Exhibit XX with Defendant's Exhibit Berry Blueprint No. 1.

A. Referring to the letters shown on Defendant's Exhibit XX and comparing the parts shown on Defendant's Exhibit Berry Blueprint No. 1, I find the corresponding parts as follows: The casings C C are shown in the blueprint at B B; the conduit G is shown at 46; the sleeve S at 32; the lever R at 31; stems T at 37; by-pass J at 43, and by-pass lever K at 49, and by-pass link U at 40; bell-crank M at 19 and lever N at 21; valve stem O at 23, and piston P at 25; the slide Q at 29.

Q. 139. I now place before you Defendant's Exhibit ZZ, covering up the title underneath and ask you to state what is represented by that exhibit.

A. Defendant's Exhibit ZZ represents a Girard

water-wheel in the open casing, the main bearing of the water-wheel shaft, base supporting the entire machine, fly-wheel B forming a part of the governor, sliding collar H, lever I and rod B, all being portions of a mechanism designed and constructed by the Girard Water Wheel Company, and furnished to the Power Development Company and installed by them on the Kern River near Bakersfield.

Q. 140. Please now compare the device shown in Defendant's Exhibit ZZ with that disclosed in Defendant's Exhibit Berry Blueprint No. 1.

A. Referring to the letters marked on Defendant's Exhibit ZZ and comparing the parts so marked with Defendant's Exhibit Berry Blueprint No. 1, we find the fly-wheel B at 1, sliding collar H at 13, the lever I at 14, the rod B at 17, wheel-case shown, but not marked in the photograph, is shown at B B, main bearing shown on photograph but not marked, is shown on Defendant's Exhibit Berry Blueprint No. 1 at 18. The governor parts illustrated in Defendant's Exhibit ZZ but not specifically lettered are shown at 2 2, 5 5, 6 6 and 12 12, and 7.

Q. 141. You have mentioned in your previous testimony the operation of the returning device, not stating the reasons for your opinion as to the impracticability of the device shown and described in the Lyndon patent in suit. Please state more fully your reasons for the opinion expressed at that time.

A. Referring to Complainant's Exhibit C representing in a clearer manner the parts shown in figure 1 of the Lyndon patent No. 695220, we find this returning device to consist of a clutch part 23 free to move endwise on

the shaft 12, but constrained to rotate therewith, the clutch part 22 freely mounted on shaft 12, and having connected to it by bolt or pin a connecting rod 25a, which is attached to the return rod 25, having thereon the springs 29 29, held between collars 29a 29a, a bearing on fixed frame portion 30, and springs 27 28, held between collars 27a 28a, and bearing on either side of the control-lever 26. This clutch is thrown into action through the lever 24 fulcrumed at 24a, engaging on one of its ends through a fork the clutch member 23, and having on its other end an armature 31 which is attracted to the electromagnet 32 on the passage of current there-through. The current required to energize the said electromagnet 32 is supplied by the generator 8, on the making of a connection at contact points 45 45a, 46 46a, in the circuit 102 98 99. The contacts 45a 46a placed opposite to the contact 45 and 46, are mounted on the lever 43 fulcrumed at 43a, provided with a curved slot 44, having therein a pin or roller 44a attached to the bell-crank 42, which is fulcrumed at 42a to a fixed frame member and connected at its third end to a rod not marked in this exhibit but marked 36 in figure 1 of the Lyndon patent. Said rod 36 is connected to the rod 35, forming a portion of a core 34, acting within and influenced by the solenoid 33. The action of this core 34 is resisted primarily by the spring 38, modified by the action of springs 37 27 28 29 29. Solenoid 33 is energized at all times during the operation of the plant by means of a current furnished by the generator 8 through a circuit marked in this exhibit 35a, and in figure 1 of the Lyndon patent 33a. The arrangement of these parts is such that at the normal

operating speed the current furnished by the generator 8 to energize solenoid 33 sufficiently to attract core 34 by an amount equal to the tension in the spring 38 modified as before mentioned. On increase of speed the pull on core 34 is increased, resulting in a movement of the core 34 within the solenoid, making a contact at 40 40a, and through the mechanism before described at 45 45a, 46 46a, 103 100, 104 101. As shown in the drawings and described in the specifications, the contacts on the lever 43 are made simultaneously with those on the lever 26. As electric action is extremely rapid this will produce simultaneous action at the electromagnets 15 and 32. Examining the relation of the part furnishing motion to the clutch member 23, we find it to be the water-gate-operating shaft 12 set in action by the reversing clutch-gear shown at 9, 10, 11 and 13, deriving power from the driving shaft 6. The movement required on the part of the clutch member 22 to throw open the contacts at 40 located on lever 26 is very small, being a small part of one revolution. The water-gate-operating shaft 12 as shown is a high speed member operating much more rapidly than the succeeding portions of the device connecting it to the water-gates. In consequence of the various relations mentioned, and especially the simultaneous action of contact and the small movement required in that part of the clutch member 22, the control-lever 26 will be acted upon within an exceedingly short time after gate-operating shaft 12 starts to move, and as a consequence of this, the contacts at 40 40a are open, the electromagnet 15 is deenergized, the lever 14 is returned to central position by means of its balancing springs, the action of the clutch

13 ceases, preventing further motion of the water-gate-operating shaft 12. Furthermore, the disconnection of these parts and return of the control-lever 26 to its neutral position, leaves said control-lever free to respond to the action on the part of the solenoid 33 and its core 34. This freedom permits the core 34 to immediately re-engage contact 40 unless within this exceedingly short interval of time the generator 8 has returned to its normal speed, at which point the control-lever 26 is balanced in its neutral position. Following this reengagement at contacts 40 40a, the cycle of operations before described reoccur and will continue, disengaging and engaging the control-lever 26 and the clutch 23 22 in an exceedingly rapid manner. The means shown provide no parts by which these movements can be constrained and controlled in order to permit the water-gates to be operated to the amount required. In other words, the operation of the returning mechanism is dependent solely on the speed variation of the dynamo 8, and has exceedingly small relation with the movement of the water-gate-operating parts.

May 1, 1914, A. M.

Q. 142. By Mr. Westall: Suppose you were to construct a device substantially in accordance with the drawings of the Lyndon patent in suit, and were to set that device in operation by permitting water to flow through the main pipe-line. Please state how you would expect the device to operate.

Mr. Blakeslee: We object to this question as necessarily indefinite. The word "substantially" is very elastic, and we wish to know, before we permit this question

St. Berry recalled direct examination resumed

to be answered without objection, whether the answer means a construction in accordance with the drawings or one subject to alterations under the control of mental reservations of one sort or another.

Mr. Westall: By "substantially" is meant in such manner as one skilled in the art with the Lyndon patent before him, and who had been requested to build a device in accordance with the specifications and drawings of the Lyndon patent, would build such device. There are always, of course, minor changes in the actual construction of a device. But by "substantially" I mean approximately "exactly."

Mr. Blakeslee: The further objection is made that the question does not call for the best evidence but for a mere question of opinion. We are charging infringement of this patent by the embodiment of the invention in certain apparatus. That is open to discussion and has been discussed in this case. If the defendant wishes to produce any other construction alleged to embody the invention of this patent and following more or less specifically the exact line and word disclosures of this patent, let it do so. And let the evidence be adduced to show how the same operates. The patent is presumed to be operative and speaks for itself, unless evidence can be adduced contrary to the general purport of the patent.

A. In view of extremely rapid action described in my last answer of the returning device, and the relatively slow movement of both the water-gate parts and the bypass parts, and the weight and size of these latter parts, I would expect in a mechanism constructed in accordance

with the Lyndon patent specifications to find a rapid intermittent attempt on the part of the contract-making devices to operate the said gate and by-pass parts, and an equally rapid attempt on the part of the returning device to prevent such action. In view of these conditions, the gate and by-pass parts, if they move at all, would do so by an exceedingly small amount during each cycle, especially in the case of the butterfly by-pass valve, which in most plants would be large and heavy, and subject to a great difference of pressure on its two sides, which difference in pressure would vary rapidly with any displacement from its normal position. There is in a valve of this nature the necessity of considerable exertion of power and the lapse of a certain amount of time to produce movement, which, taken in connection with the lost motion throughout the mechanism, would tend to the result predicted.

Q. 143. By Mr. Westall: State whether or not it would be possible to correct the effects which you have mentioned by the substitution of contracts which would allow any given sequence of energization of the different circuits? State if any such arrangement could be made which would obviate the difficulties which you have pointed out, and, if so, please indicate.

A. I do not see at the present moment that a mere substitution of sequence in action of these various contacts for the simultaneous action shown would materially affect this result.

Q. 144. Does the Lyndon patent indicate that any such sequence of energization was contemplated?

A. A careful study of the specifications and drawings

fails to disclose such intention. It is true that figure 6 shows a type of control different from that shown in the other figures, but it does not disclose any sequence in operation. I find on page 3, line 29, the following words: "When the governor-shaft 12 is set in operation in either direction by the controlling-solenoid 33, the rod 36 operates the lever 43 to close the circuit of the clutch-magnet 32, which causes engagement of disks 23 22 and causes the disk 22 to be carried slightly around one way or the other, according to the direction of movement of the governor shaft 12, thereby returning the lever 26 to normal position." This statement describes what happens when the governor shaft 12 is set in operation and contains no indication of a delay in this case uncontrolled by any part or parts shown. If Mr. Lyndon entertained such an idea, he failed to disclose it in the patent in question.

Q. 145. Have you read the testimony on behalf of the complainant in this case of Mr. C. L. Cory regarding the substitution of mercury contacts at 45 45a, 46 46a, 100 103, and 101 104?

A. I have read such testimony.

Q. 146. State whether or not you agree with Prof. Cory's conclusions therein expressed as to the modification of the construction of the device of the patent in suit by the substitution at contacts 45 45a, 46 46a, 100 103, and 101 104, to obviate the defects which you have heretofore pointed out as rendering the device of the Lyndon patent inoperative as disclosed in the specifications and drawings in the patent in suit.

Mr. Blakeslee: Objected to as placing a construction

on the testimony of this witness which is not in accordance with such testimony, namely, that the witness has never testified that the disclosure of the Lyndon patent in suit is inoperative. At least, if that is the position of the witness, we wish to know it. We do not so understand it.

A. I agree with Mr. Cory as to the possibility of using mercury contacts in substitution for those at 45 45a, 46 46a, 103 100, 104 101, as shown in the Lyndon patent. I cannot, however, agree with his conclusions as to the results to be obtained by this substitution.

Q. 147. By Mr. Westall: Please state whether or not in your opinion such substitution of such mercury contacts would render the Lyndon patent device operative?

Mr. Blakeslee: The same objection, and also that it is leading and suggestive.

A. The substitution of mercury contacts for those shown in the patent at 45 45a, 46 46a, 103 100, 104 101, would not, in my opinion, render the mechanism operative, even for the sequence of action aimed at.

Q. 148. By Mr. Westall: I call your attention to the statement made by Prof. Cory in answer to question 21 at line 22 of page 141 of the record in this case, reading: "It is evident to one skilled in the interpretation of the operation of such contacts that, as desired, contacts 45 and 46 may be made to precede, if you please, the making of contacts to 103 and 104, which lead to circuit 105, and the operation of the compensating magnet 64." and I ask you to state what would be the effect of such construction of the device of the patent in suit.

A. Placing such construction on the mechanism shown

in the patent in suit as would allow contact to be made at 45 45a, 46 46a, before that made at contacts 100 103, 101 104, which latter contacts control current in the circuit 105 and energizing the compensating magnet 64, thereby setting in action the clutch 58 57, and moving the by-pass valve through the sheave 54, ropes 51 52, double lever 50, stem 49. As making of contacts at 45 45a, 46 46a, furnishes current through the circuit 102 to energize the returning magnet 32, operating through the armature 31; lever 24, clutch member 23 and 22, to set in action the returning device, tending to return the control-lever 26 to its neutral position, I would expect that the sequence of action would ^{prevent} ~~precent~~ any operation of by-pass valve 48. The action of the returning magnet is exceedingly quick, and the fact of its being set in operation ahead of those parts controlling the butterfly valve would preclude movement of the butterfly valve 48—

Mr. Blakeslee: We will stipulate that under those conditions the returning device would act before the by-pass, and maybe the by-pass would not work at all, and that this shows the versatility of the device and assumes a condition of governing or a governing condition without the use of the by-pass for instance, if such were desired.

A. This sequence of operation just described being provided for in the design of the parts is in no way automatically adjustable during the operation of the plant from time to time, and, if true, under one condition of load it must be true under all conditions of load change. The question of sequence of action in this mechanism, furthermore, involves as a necessary condition that the pull of the core 34, due to the action of the current in

solenoid 33 in relation to the tension of the spring 38, modified as previously mentioned, shall be carefully balanced in the various positions which such core 34 may assume. Action of core 34 thus being the result of an increase or decrease of voltage in the generator 8, resulting from an increase or decrease in speed, which tends to produce a new position of balance in these parts. Therefore the nature of said sequence of action is the result of a speed change in generator 8, and the time element provided by said delayed action is dependent upon the time element of the speed change. In other words, the more violent the change in the speed of the generator 8 the less time permitted in this delayed action which tends to defeat the purpose of such delayed action. Furthermore, adopting the sequence before described, which was that contacts at 45 45a, 46 46a, preceded that at the contacts 103 100, 104 101, both being assumed to follow contacts at 40 40a, or 41 41a, depending on the direction of speed change, when the returning device before described comes into action as the result of said contact at 45 45a, 46 46a, it reverses the sequence described, upon opening the contacts 45 45a, 46 46a first, which action with a sufficient provision for delay would fail to open contacts 40 40a, or 41 41a, and contacts 100 103 and 101 104, and result in the return of the returning device to its normal position by means of its centering springs, without having accomplished the object aimed at. This action would result in a rapid vibration of the levers 26 and 43, making and breaking the contacts at 45 45a, 46 46a, and having no other effect. The necessary delicateness of the balanced condition between the core 34 and spring 38

renders this device extremely sensitive to the application of any exterior force, which force is applied in a violent manner on the action of the clutch-returning parts 23 22. In short, with this necessary balanced condition, the clutch parts 22 23 must of necessity disturb the balance and tend to return the lever 26 to its neutral position. Thus, in a general way, the substitution of sequence or action for simultaneous action introduces other difficulties of equally great effect on the mechanism and in no way improves the device as an operative machine. The rapidly recurring intermittent action has been slightly changed in location.

Q. 149. By Mr. Westall: Suppose that we consider or assume that instead of half-open as the normal position of the by-pass valve, as is very clearly described by Lyndon, that the normal position of the Lyndon by-pass is assumed to be closed. Please state what effect an adjustment of the different parts having that result would have in the practical working and operation of the Lyndon device.

Mr. Blakeslee: Objected to, in the first place, as putting a construction on the Lyndon patent by telling the witness what the patent discloses, and then asking him to tell the court something it discloses, and leading and suggestive.

A. Examining the mechanism shown in the Lyndon patent in suit, I find that such assumption is not possible for the following reasons: the operation of the by-pass valve 48 is controlled as to its movement both in the one direction and in the other by a single circuit 105 operating a single compensating magnet 64. The mechanism

provides a set of contacts in this circuit 105 shown at 75 and 74, whereby the said circuit 105 is interrupted at either full closed or full open position of the by-pass valve 48, this action being produced by the pin or pins 73 coming in contact with the part 74. The provision of this cut-out device is made in order to interrupt the circuit controlling electromagnet 64, and stop further action on the part of clutch 58 57 and sheave 54 which, operating through ropes 51 52, double lever 50, stem 49, controls the movements of said by-pass valve 48 at both extremes. The construction of the cut-out device mentioned requires as a necessary condition that there shall be a certain return movement on the part of the sheave 54, weight 70, ropes 51 52, double lever 50, stem 49, by-pass valve 48, in order to again connect this circuit at contact 74 75 and make it available for subsequent action. It is evident that without this return movement the contact at 74 75 will remain open, and it will not be possible for the contacts at 100 103 and 101 104 to cause current to pass through circuit 105 and energize electromagnet 64, thus completely tying up this part of the mechanism and preventing all further action. This result would be the same whether full open or full closed would be assumed as normal position.

Q. 150. By Mr. Westall: Please state whether or not the following statement of Mr. Lyndon at page 4, line 80, of the Lyndon specifications, is inconsistent with any opinion you have expressed in your answer to the last question: "After the governing takes place the by-pass gate is either open or closed, or nearly so, and in order

to be useful for a second governing must return to its normal position.”

A. The reference made to page 4, line 80, of the Lyndon patent expresses exactly the idea developed in my last answer.

Q. 151. Suppose that it is assumed that the normal position of the by-pass valve of the Lyndon patent is not full closed but in a position nearly closed, so as to permit constant partial flow under normal conditions. Would that assist in rendering the device operative, and what would be the operation of the Lyndon device under such an assumption?

Mr. Blakeslee: Objection is made to the implication of inoperativeness in the question, not following the witness in this respect.

A. The answer to the last question involves a consideration of the conditions obtaining in the pipe-line under operating conditions. For simplicity, assume a pipe-line filled with water flowing at a steady velocity in accordance with the amount of water being discharged, by a valve at the lower end. Under these conditions, the velocity being constant, the pressure in the pipe behind the valve will be constant. Assuming first an opening action of this valve, it will be admitted without question that a pressure gauge placed on the pipe close to the valve will show a decreased pressure following the gate movement instantaneously. This drop in pressure indicates clearly and positively that the flow in the pipe at the point to which the gauge is attached has increased. On any other assumption it would be impossible to account for the fall in pressure. Accompanying this de-

crease of pressure in the pipe, there will be a decrease in the spouting velocity of the water through the nozzle, which decrease, however, is not counteracted by the increase in opening. For, if it were so, there would be no change in the velocity in the pipe behind the valve, and no change in pressure. The condition here is that the valve has opened in a greater ratio than the spouting velocity has decreased, this being required to accommodate the increased flow which is positively indicated by the fall in pressure. Conversely, on a closing action of the valve, it will be admitted without question, that the pressure gauge connected to the pipe close to the nozzle would show an increase of pressure. This is a positive indication of a decrease of flow in the pipe at that point. for otherwise it would be impossible to account for increase in pressure. Accompanying this increase in pressure there will be an increase in spouting velocity through the nozzle, but such increase of spouting velocity is not in the same proportion as the decrease in area of the nozzle. This condition being necessary to account for the increase of pressure and consequent decrease in the velocity in the pipe. The question of acceleration and retardation of water in a pipe under pressure is dependent not upon the head upon the pipe-line but solely upon the changes in that pressure. To retard a column of water requires an increase of pressure at the lower end. Conversely, to accelerate a column of water requires a decrease of pressure at the lower end of the pipe. In all cases like pressure changes above and below normal produce like velocity changes in the line in retardation and acceleration. However, these

movements are considered mathematically as exactly the same in nature, one being indicated as a minus quantity and the other as a plus quantity. There is no difference in the nature of these two operations of natural law nor any difference in the effect of equal pressure changes. Considering these principles the object aimed at in the Lyndon patent in suit, which is the overcoming of these opposite effects, and the means which he proposes are to preserve unchanged velocity and pressure in the pipe-line during governor action. The principles above described make it necessary, for the complete attainment of this object, that the control shall be exercised through the by-pass valve of the velocity and pressure in the conduit both during opening and closing action of the main watergates. Acceleration and retardation of water in a pipe-line has no necessary relationship with the amount of head or pressure existing in that pipe, but solely and only depends on the changes above or below normal of that pressure. In conclusion, and following the specifications of the Lyndon patent, we find that the attainment of his objects requires that the by-pass valve shall be in such an open position as to supply at any instant any quantity of water required by an increase in load on the wheel, and at the same be in a position to discharge water rejected by the wheel on a decrease of load. Failure to supply this quantity of water and failure to provide for the by-passing of rejected water means failure to attain his prime object, which is government regardless of water economy.

Q. 152. By Mr. Westall: Assuming that an electro-mechanical water-wheel governor is constructed in ac-

cordance with the disclosures of the Lyndon patent, but with the exception that the device is so adjusted that the normal position of the by-pass valve will be closed; and now assuming that the main valve is moved from half to full open position. Would then a movement of the by-pass valve from a closed position to an open position assist in the attainment of Lyndon's object, to-wit, the maintenance of a constant spouting velocity, or would it tend to defeat that very object by diverting a portion of the water supply from the main supply through the by-pass?

Mr. Blakeslee: This question is objected to as assuming apparently a number of clashing conditions, such as setting the by-pass closed, setting it part way open, setting it all the way open, and then at his conclusion assuming various objects as to the spouting potentials, or whatever the word "spouting" may imply, and then injecting into the Lyndon patent a term which we believe not to be therein found, and limiting the disclosure of the Lyndon patent to an indefinite definition, and as further calling for a conclusion based upon a supposition as arbitrary as possible in view of its indefiniteness, and as not direct examination in defense but rather involving purely theoretical considerations, with apologies to the term "theoretical."

A. Assuming the construction of an electro-mechanical device used in conjunction with a water-wheel built in accordance with the disclosures of the Lyndon patent specifications and drawings, with the exception that the by-pass valve assumes a closed position as its normal position, and further considering the main water-gates

in half-open position, and that an opening action to full open takes place, under these conditions a movement of the by-pass valve toward open position tends to defeat totally the object aimed at by Mr. Lyndon as disclosed in the specifications of his patent, this object being the maintenance of constant velocity and constant pressure in the conduit during governing action.

Q. 153. By Mr. Westall: Suppose you were requested to design and install an electro-mechanical water-wheel governor, constructed in accordance with the specifications and drawings of the Lyndon patent in suit, and that you were instructed to disregard any errors in the specifications, and to exercise your inventive skill in making such changes as you might find necessary, to make this device operative—for instance, increasing or diminishing the size of the water supply pipe and the by-pass, the construction of the valves therein shown, the insertion of mercury or other contacts at any place where they might aid in the working and operation of the device—please state what changes, if any, you would make, to enable the results sought by Lyndon to be accomplished. In other words, to make an operative water-wheel governor.

Mr. Blakeslee: Objected to as assuming, in the first place, inoperativeness of the subject of the Lyndon invention, and, in the second place, as calling for a plurality of answers or conclusions, and, in the third place, as assuming facts to be produced by invention referred to and not concerned in this issue or discussed by the witness, and as being purely and solely an omnibus hypothetical inquiry incapable of direct and positive re-

sponse, and as irrelevant, immaterial and incompetent, leading and suggestive.

A. I would regard such request as being impossible of accomplishment without very extensive consideration and study.

May 1, 1914, P. M.

Q. 154. State whether or not in your opinion it would require anything more than ordinary mechanical skill to make such changes in the device of the Lyndon patent in suit as would make such device operative.

Mr. Blakeslee: The same objection.

A. After very careful study of the device shown in the Lyndon patent I consider that it would require radical modifications in certain particulars in order to give it a possible chance of success.

Q. 155. By Mr. Westall: Suppose you were to undertake the labor of reorganizing the mechanism of the Lyndon patent in suit for the purpose of making an operative device. Along what lines would you proceed as most likely to lead to the desired result?

Mr. Blakeslee: The same objection.

A. I would not undertake such a commission without a clear understanding to the effect that the compensation for the work involved would not depend upon results. Further, I would have to be satisfied that the person requiring such work done had a full understanding as to the effect of any changes I might consider necessary in the proportion of the by-pass to the water-wheel capacity. This understanding would be necessary for the reason that a complete realization of the objects of this mechanism would require very large constant

Sh Berry recalled direct examination resumed

By Mr Westall

waste of water, which waste to the extent involved in this case would be very much greater than could be ordinarily permitted. These points understood, I would consider it necessary as a first step to make a careful study of possible re-arrangements of the return device in order to remove it from its present responsiveness to speed changes in the generator and place it elsewhere, making it respond to a varying degree to the movement of the water-gate parts. I would consider further possible means of placing restraints on certain of the parts of the control mechanism in order that these might be under adjustable control. What further changes I would consider necessary would have to result from further study of the problem.

Q. 156. By Mr. Westall: After careful study that you have given to the patent up to the present time, would you approach the subject of reorganization of the Lyndon patent, or do you feel that you could approach the subject of reorganization of the Lyndon device so as to secure an operative mechanism with any great degree of confidence as to ultimately effecting the objects aimed at?

Mr. Blakeslee: Objected to as calling for a mere expression of idle opinion or guess upon the part of the witness, and not calling for a statement of facts, not in any way affecting the issues involved in this suit, irrelevant, immaterial, incompetent, and that the witness is not qualified.

A. I would not undertake such work without express understanding that I would not be responsible for results. In other words, I see at present no definite con-

clusion to such work, nor any certain line which could be followed with any assurance of success.

Q. 157. By Mr. Westall: State whether or not water economy is a factor of importance generally in the designing and installation of water-wheels and water-wheel governors, and, if so, to what extent?

A. In a majority of plants installed for the generation of power from water the question of water economy is of vital importance. In many cases thousands of dollars are expended to attain this object, extensive reservoirs being provided and any possible means adapted to store water. There are some cases where prior rights to the flow of the stream involved require that the flow shall not be disturbed; that the water be allowed to pass down the stream bed, irrespective of whether it is used in the power plant or not. Under such conditions, by-pass valves are often furnished to permit such constant flow. But in the device disclosed in the Lyndon patent in suit, should the by-pass be made of sufficient capacity to take care of full load changes, there will be flowing at full load on the wheel an equal quantity of water in the by-pass as is taken by the wheel. In this case should the prior rights demand the flow of the quantity wasting through the by-pass when in normal position at full load, there would be flowing at least this quantity. On the other hand, should the prior rights demand the flow of the water wasted through the by-pass together with that used on the wheel, the quantity by-passing would be correct at full load but at all loads under that would be less than that required. In such cases wherein water economy is not essential the

installation of this device arranged to take care of full load changes, the investment in pipe-lines, ditches, canals, gates, etc., would be doubled in a general way, so that even though there be plenty of water to waste the investment in these parts would be about twice that required by a device using no more than the quantity of water required at full load.

Q. 158. Suppose that some mechanism could be devised to take the place of the devices which you have described in your foregoing testimony as rendering the device of the Lyndon patent in suit inoperative, which would operate a main water-gate and a by-pass valve like that described in the Lyndon patent, and in the manner in which Lyndon sets forth in his specifications, what have you to say as to the commercial practicability of such a device where water economy is essential?

Mr. Blakeslee: The same objection, and it is again pointed out that the counsel is attempting to read into the answer the statement of inoperativeness, and that the witness apparently balks by using such words as "success", which are relative.

A. In cases wherein economy of water is a factor, or a desirable feature, I would not consider the device shown as practical commercially, inasmuch as attainment of the objects set forth would prevent such economy of water.

Q. 159. By Mr. Westall: When the main water-gate of the Lyndon patent is in closed position state to what extent, if at all, the device of the Lyndon patent acts as an economizer of water.

Mr. Blakeslee: Objected to as indefinite; the main

water-gate has not been located as we understand it.

A. When the main water-gate of the wheel disclosed in the Lyndon patent is closed, the by-pass valve is in half-open position, thereby wasting a quantity of water equal to one-half the full capacity of the by-pass.

Mr. Blakeslee: In connection with our previous objection, we will state that the question appears to us to differentiate between the wheel-gate, the movements of which are accompanied by movements of the by-pass, and the main gate.

Q. 160. By Mr. Westall: In the Lyndon patent, please state whether or not you find therein disclosed more than one part that could be properly called a main gate?

A. In the drawings accompanying Lyndon patent No. 695220, the only gate shown or mentioned is a main gate controlling the admission of water directed to the wheel and the by-pass gate.

Q. 161. In view of your previous testimony regarding the operation and functions of the part which is referred to as the by-pass, what have you to say as to the appropriateness of the term "by-pass" to describe that part?

A. The function of the by-pass being to discharge water from the conduit, without driving the wheel, I find that the term is very appropriate as applied to the mechanism shown.

Q. 162. During the normal operation of the Lyndon device for a given load on the wheel, state whether or not there is a constant flow of water through the by-pass.

Mr. Blakeslee: Objected to as indefinite and as necessarily involving a plurality of responses, as the load is not specified and many loads may therefore be assumed as coming within the purport of the question. The further objection is made that there is no specification put as to the condition of the apparatus with respect to quiescence or governing.

A. Normal operations of this device being considered to be under the condition of fixed speed at any load, which may be upon the wheel at any particular time, there will be a constant waste of water through the by-pass valve equal to one-half the capacity of the by-pass.

Q. 163. By Mr. Westall: Before the preparation of Defendant's Exhibit Berry Blueprint No. 1, as testified by you in your previous testimony, state whether or not you made any effort to find the original drawings prepared by you in 1896 as testified, and, if so, describe what efforts were made and the results obtained.

A. I made all the efforts necessary to reach a definite conclusion on this question. I interviewed an officer of the Electrical Engineering Company, which company was the last owner, as far as my personal knowledge went, and was informed by him that these drawings had been transferred by the Electrical Engineering Company to the Otis Elevator Company at the time when the former company was absorbed by the latter. On a visit to the office of the Otis Elevator Company I was referred to the estimating force as being men in a position to know of all drawings in their possession at present, and on inquiry concerning these water-wheel drawings was referred to a third person as being one who, by rea-

son of his connection with the Otis Elevator Company at the time of the transfer mentioned and familiar with that transfer, could give me definite information concerning these drawings. He assured me that these drawings, by reason of the fact that they were not within their vaults at the time of the fire which occurred in San Francisco in 1906, were destroyed by that fire.

Q. 164. Can you give the names of the persons that you have mentioned?

A. The official formerly connected with the Electrical Engineering Company was E. C. VanEmon. The names of the other persons I did not obtain.

Q. 165. Could you get the names of those other persons before the close of your testimony in this case so as to be able to testify positively who they were?

A. As these men are in San Francisco, I believe that I could do so.

Q. 166. I will ask you to do so some time at your convenience. I now call your attention to Complainant's Exhibits E to L, inclusive, and ask you to state whether or not you have examined such exhibits and whether you understand the use and purpose of the device therein pictorially represented.

A. I have examined Complainant's Exhibits E to L inclusive, and understand the operation of the parts there shown.

Q. 167. I will now ask you to describe the devices shown in the exhibits of Complainant, E, F and G, explaining fully the operation of the same, and stating the relation of the various parts and their mode of opera-

tion and effect, giving your reasons in full for any conclusion you may express.

A. Complainant's Exhibits E, F, and G, are marked as representing the Cottonwood plant. Taking the reference letters marked on these photographs, A represents the water-wheel housing within which is presumed to be placed a water-wheel mounted on the shaft I, driving the generator J. C represents the floor plates, probably removable for the inspection of the parts below. D shows the shaft on which are mounted the levers operating the gates. Lever E being apparently a lever attached to the shaft D and operated from the governor through the parts X. B shows a water-gate placed in a conduit, and adapted to close off entirely the supply of water to the unit. F indicates the body of the governor. G shows the fly-balls of the governor. H is the pulley driving the governor through the belt running on the shaft I. K is the connecting part between the shaft X and the dashpot, located at the upper part of the governor. L is the piston rod of the said dashpot. M the upper end of the threaded valve controlling the passage of oil from one side of the piston to the other, located within the dashpot. Z shows the pump used to supply oil to the operating cylinder W. Y points in a somewhat indefinite manner to the lower end of the stem of the governor. P represents a lever attached to the shaft D, operating through the link Q, the double lever R fulcrumed at T and connected at S to the main water-wheel-gate stem N and at U to the piston rod of the piston within the dashpot which is connected to the automatic

relief valve, which is shown in the photographs. The operation of this plant would be as follows:

On opening the gage B in the main conduit, water is admitted and passes through the main water-wheel gate, imparting motion to the wheel and to the generator mounted on the shaft I. Running on the shaft I are two belts, the larger one of which is utilized to drive the pump Z to furnish the oil under pressure to the means for operating the water-wheel gates, and the smaller one of which is used to drive through the pulley H the speed-sensitive element G of the governor. The admission of oil furnished by the pump Z to the operating cylinder W is controlled by means of a valve not shown, operated by the governor parts G, the movement of which, consequent upon action of the speed-sensitive parts of the governor, is to admit oil under pressure furnished by the pump Z either to the top or bottom side of the piston contained within the cylinder W, thereby moving said piston upward or downward and through means of appropriate connections turning the shaft X, moving the link also marked X and imparting motion to the lever E, the shaft D, lever P, link Q, lever R and the stem N, of the main water-wheel nozzle, at the same time moving in an inverse direction the piston attached to the connection shown at U. This piston is located within the dashpot containing oil and provided with an adjustable valve by which the rate at which the oil may be displaced from one side of the piston to the other is controlled. The cylinder of this dashpot is directly connected to the needle of the auxiliary relief valve which moves in response directly to any movement of the casing and dashpot.

Details of this dashpot are not shown on the photographs. The design and arrangement of the various parts of this mechanism is such that upon action of the governor responsive to speed-sensitive changes, the needle of the main water-wheel gate is moved either to close or to open, in accordance with the nature of the speed change, and under certain conditions the needle of the automatic relief nozzle can be moved in an opposite direction, this latter action taking place normally only on closing action of the needle of the main water-wheel nozzle. The connection K transmitting motion of the shaft X to the dashpot placed on the upper part of the governor, imparts to the piston L of the dashpot motion derived from the motion of the shaft X. The details of this dashpot are not fully shown, but the casing is connected to a rack sliding horizontally in close proximity to the stem of the governor, generally indicated by the letter Y. On this stem, and engaging the said rack, is a pinion, the connection being such that upon movement of the casing of the dashpot in one direction or the other this rack is displaced, imparting a rotary motion to the stem of the governor and, by means of a thread on the end of said stem, causing a lengthening or shortening of this part and tending to displace the balanced valve controlling the admission of oil under pressure to the operating cylinder W. The construction of the said pinion and rack are such that the stem of the governor is free to move vertically without exerting any influence upon the said rack. The object of this dashpot mechanism placed on the upper end of the governor is as follows: when the speed-sensitive part G on the

governor responds to the speed changes of the wheel, it produces changes in the location of the needle of the main water-wheel nozzle, tending to readjust the quantity of water supplied to meet the changed load conditions. This effect follows the governor change by a certain interval, depending on the conditions, which would cause the overrunning of the governor, were it not for the provision of the dashpot to prevent it. The action of the dashpot through the rack and pinion mentioned is to tend to reverse the action of the balanced valve and bring it toward or to neutral position before the speed of the parts G has returned to normal, the intention being to counteract the lag in the action before mentioned.

Q. 168. Referring now to Complainant's Exhibits H to L, inclusive, please describe the devices therein pictorially represented, describing the operation of the same, and giving your reasons in full for any opinions you may express.

A. Complainant's Exhibits H to L, inclusive, are marked "Division Creek No. 2" and represent a water-wheel supposed to be operating within the casing A A, mounted on the shaft T T, driving the generator J J. Running on T T is a belt driving the pulley D D adapted to impart motion to the balls C C of the governor, the main conduit supplying water to the wheel being shown at Q Q in an extension of which P P is located the stem M M, connected to the needle nozzles supplying water to the wheel. On the stem U U of the governor is located the balanced valve supplying pressure fluid to the cylinder F F either on one side or the other of the piston

contained therein. The movement of this piston operates the rack G G and quadrant gear, having the same mark G G, imparting motion to the shaft indefinitely shown at H, H, on which is located the lever, not marked, but connecting to the rod I I, attached to the lever K K and rotating shaft L L, on which is mounted the double lever N N and connected at the upper end with the stem M M of the needle nozzle and at the lower end at R R to the piston rod S S of the dashpot used to impart motion to the needle of the auxiliary relief valve not shown in the photograph. The casing of the dashpot is directly connected to the needle of the auxiliary relief valve which responds directly to the movement of this casing. Within the dashpot is located a series of adjustable by-pass valves which control the rate of flow of oil from one side of the piston to the other, thus controlling the rate of transmission of movement from the piston directly connected to the double lever M M and the casing of the dashpot. Springs W W bear between lugs cast on the casing of this dashpot and nuts on the rods, one of which is shown but not marked, and which is rigidly connected to the fixed water-wheel casing. The arrangement of these various parts is such that no movement of the governor responsive to speed changes of the wheel the balanced valve mentioned causes motion of the piston within the power cylinder and opens or closes the needle or the needle nozzle, and under certain conditions reversely operates the needle of the auxiliary relief valve. Normally this latter action takes place only on closing movement of the needle nozzle supplying water to the wheel, the action in the contrary case

being precluded on account of the fact that through the agency of the springs W W the auxiliary relief nozzle is normally closed. Mounted on the rack G G is a standard X X which imparts the movement of the said rack through links and levers to the piston rod also marked X X, having on the end within the casing of the dashpot a piston. The casing of the dashpot is rigidly connected to the rack placed in close proximity to the stem of the governor C C, free to move horizontally in response to movement of the casing of the dashpot. Located on and forming part of the stem of the governor C C and as indistinctly shown at U U is a pinion engaging the said rack in such manner that movement of the said rack causes a rotation in one direction or the other of said stem and by means of the thread at the upper end of said stem causing the lengthening or shortening of this part displacing the balanced valve in proportion to such rack movement. At Y Y is shown an adjustable valve controlling the rate of flow of oil from one side of the piston in the casing to the other. The construction of this valve, the upper end of which is shown at Y Y, is such that on being completely closed there would be no flow of oil within the cylinder, and, as a result, the casing of the dashpot would move in exact accord with the movement of the piston. On slightly opening this adjustable valve a small amount of oil is allowed to pass and there will be a slip between the casing and the piston. The more widely open this valve Y Y, the greater this slip. The valve Y Y can be adjusted by hand, and is also automatically controlled by a mechanism, part of which is shown at Z Z. The purpose of

this dashpot is to produce a constant tendency to return the balanced valve controlling the admission of pressure fluid to the operating cylinder F F to its neutral position. As before mentioned, there is a time lag between the operation of the speed-sensitive part C C in the governor and the application of the proper quantity of water to the wheel. The intended result of this dashpot mechanism is to counteract said time lag and to stop gate action at a certain time interval before the governor has returned to normal speed. On a decrease of load on the water-wheel the speed of the part C C of the governor slowly increases, depressing the balanced valve supplying pressure fluid to the operating cylinder F F, and causing the connected parts to move in such a direction as to close the needle nozzle supplying water to the wheel, at the same time opening the automatic relief nozzle through means of dashpot connected therewith. The arrangement of parts of the dashpot placed on the upper part of the governor is such that the resulting movement of the rack tends to raise the said balanced valve, restoring it to its neutral position, before the speed-sensitive part C C of the governor has returned to normal speed. On displacement of the rack rigidly connected to the casing of the upper dashpot, it is resisted by a spring which on the completion of the governor action returns the said rack to its normal position, the adjustment of the control-valve Y Y being such that this returning action is made at the same rate that the governor returns to its normal position, thereby counteracting the effect of this last governing movement on the balanced valve.

Q. 169. I now call your attention to Complainant's Exhibit V, and ask you if you understand the use and operation of the device therein shown.

A. I have examined Complainant's Exhibit V and understand the parts shown and their uses.

Q. 170. Will you please describe fully the device represented in Complainant's Exhibit V, explaining fully the operation and results accomplished by the use of such device.

A. Complainant's Exhibit V shows a needle nozzle adapted to discharge water onto the wheel contained within the casing A A and operated by the double lever N N, secured to the shaft L L, rotated by the lever K K through the link I I in the governing mechanism. The other end of the double lever N N is connected at R R to the piston rod U U U, having at its inner end piston located within the dashpot O O. The casing of this dashpot O O is connected at 6 to the stem 7 of the auxiliary relief nozzle. Springs W W, bearing between lugs cast on the dashpot O O and nuts 5, placed on the end of rod 2, connected at 3 to the water-wheel casing. Q Q represents the main supply pipe and P P an extension of the same, containing the stem of the needle nozzle supplying water to the wheel. Within the dashpot O O are located a series of adjustable by-pass valves controlling the rate of flow of oil from one side of the piston to the other within the dashpot. The operation and effect of these adjusting valves is that when closed they will permit no passage of oil, and the movement of the dashpot O O will be in strict accord with the movements of the piston and rod U U U when the piston rod is moving

away from the automatic relief valve. As these adjustable valves are opened, they will permit a freer interchange of oil, thus permitting a greater and greater slip between the two members of the dashpot. Placed on the piston at one side of the piston in the dashpot is a valve or series of valves opening in one direction only, and permitting a free passage of oil there through, the arrangement of this valve being such that on a movement of the piston rod U U U toward the automatic relief valve this free interchange of oil takes place, producing no effect on the dashpot O O connected with the automatic relief valve stem. When movement occurs in the opposite direction, the rate of movement between the piston and the dashpot is controlled by the lug location and amount of opening of the adjustable valves. These valves are so located that adjustment is such that interchange of oil from one side to the other of the piston is quite free through that part of the movement of the needle nozzle supplying water to the water-wheel nearest to its full open position. The object of this is to permit the free movement of the main needle nozzle in the portion of its movement nearest to the full opening, without affecting to any great extent the operation of the automatic relief valve. The object of the spring W W placed as shown, is to cause a constant tendency on the part of the oil dashpot O O to move towards the automatic relief valve and close it, the rate of this movement being controlled by the amount of opening of the adjustable valves within the dashpot. This tendency is always in action except when the automatic relief valve is fully closed. Should the stem of the needle

nozzle supplying water to the wheel move toward closed position at a rate slower than that fixed by the adjustment of the adjustable valves, as described in connection with the closing action of the oil dashpot, there will be no resulting movement of the automatic relief valve. The nature of the opening movement of this automatic relief valve is controlled especially by the nature of the closing movement of the needle nozzle supplying water to the wheel. In other words, the more rapid that motion the more complete is the response of the automatic relief valve. As soon as the automatic relief valve starts to open a slip will be established between the piston and the casing O O of the dashpot, resulting in a movement of the automatic by-pass valve slower than that of the main needle nozzle; on completion of governing action, when the piston within the oil dashpot becomes fixed, the springs W W will slowly close the automatic relief valve.

Q. 171. Referring now to Complainant's Exhibit U, I will ask you if you have examined and if you understand the use and operation of the device therein shown.

A. I have examined Complainant's Exhibit U and understand the construction of the various parts and their uses.

Q. 172. Will you please describe such construction and operation as you understand it?

A. Complainant's Exhibit U shows the main needle nozzle adapted to supply water driving the wheel, and the stem N forming a portion of such needle valve. D represents the shaft rotated through levers, links, etc., by governing mechanism having secured to it the lever P, imparting motion to the link Q, double lever R ful-

crumed at T, and connected at the upper point S through a link to the stem N and at its lower end to the piston rod U connected with piston located within the casing of the oil dashpot. Said casing is directly connected to the stem of the automatic relief valve. Within the casing of the oil dashpot are located a series of adjustable valves which control the rate of flow of oil from one side of the piston to the other within the cylinder to fix the amount of slip between the movement of the piston and the piston rod U, and the casing of the oil dashpot, when the said piston rod U is moving away from the automatic relief nozzle. Placed on one side of the piston within the oil dashpot is a series of valves opening in one direction only and permitting free passage of oil on movement of the piston and its rod U toward the automatic relief valve. The location and adjustment of the adjusting valves within the oil dashpot are such as to permit a much freer passage of oil on an outward movement of the piston rod U during that part of the range of the movement of the main needle nozzle nearest to its full open position, and a less free interchange of oil on the movement of the piston on the rod U in the direction away from the automatic relief nozzle during that period of the movement of the main needle nozzle nearest closed position. The reason for such differential action is found in the fact that closing movement of the main needle nozzle while near its full open position has much less effect on the conditions within the main conduits than when such needle nozzle is nearest its closed position. The spring shown bearing between lugs cast on

the casing of the oil dashpot and nuts attached to one end of the rod, shown but not marked, which is rigidly attached at its other end to a fixed portion of the mechanism, tend at all times to force the casing of the oil dashpot toward the automatic relief valve, thereby closing the valve, the rate of this movement being controlled by the arrangement of the adjustable valves above described. Should the main needle nozzle close at a rate slower than that fixed by the relation of the spring tension and adjustment of the adjusting valves, there will be no corresponding opening of the automatic relief valve, the reason for such action being that a slow closing action of the main needle nozzle does not produce dangerous pressures in the main conduit. The arrangement of the parts of the oil dashpot tending to close the automatic relief valve is such that this valve will remain closed at all times unless opened by a more or less sudden closing action of the main needle nozzle.

May 2, 1914. A. M.

S.L. Barry recalled direct examination resumed by Mr. Winstall

Q. 173. Referring again to Complainant's Exhibit V to which you have testified, I will ask you to state what the normal position of the valve in the auxiliary nozzle will be in a device constructed as illustrated in the drawing referred to.

Mr. Blakeslee: Objected to as indefinite and incomplete, the term "normally" not being given any definition in the question or any status specifically related to either the period of governing or period of rest or any of the conditions obtaining in the pipe-line or the governing apparatus.

A. The normal position of the valve of the auxiliary

relief nozzle is fully closed. This is the position assumed by that valve at the conclusion of any governing movement which has tended to displace it from such position. This result is produced by the tension in the springs W W between the fixed nuts 5 on the rod 2, and the lug 4 cast as a portion of the movable casing 0 0 of the dashpot, which is rigidly connected at 6 to the stem 7 of the said valve.

Q. 174. By Mr. Westall: The drawing referred to, namely, Complainant's Exhibit V, appears to show a constant flow of water from the auxiliary nozzle. Will you please state to what extent there would be a flow from the auxiliary nozzle in the actual operation of a device constructed in accordance with the drawings referred to.

A. In a device constructed according to Complainant's Exhibit V, there could be discharged from the auxiliary relief nozzle only on displacement of the casing 0 0 of the oil dashpot, resulting from closing action of the main needle nozzle; and inasmuch as these parts are so arranged that on the conclusion of such displacing action the casing 0 0 of the oil dashpot under the influence of the tension of the springs W W, moves toward auxiliary relief nozzle, thereby closing the valve completely, there being nothing shown in the drawing to prevent such complete closure, thereby completely stopping the flow of the water.

Q. 175. So that, if I understand your last preceding answer, if the drawing is intended to show that there is a constant flow of water from the auxiliary nozzle, said exhibit V would be inaccurate as disclosing the actual operation of the device. Is that correct?

Mr. Blakeslee: Objected to as calling for a conclusion. It is an attempt to construe the answers of the witness, and is leading and suggestive. The Exhibit speaks for itself, as does the testimony which was taken in connection with the offer of the Exhibit.

A. If the intention of Complainant's Exhibit V is to show constant discharge from the auxiliary relief nozzle as a condition of normal operation, it is to that extent incorrect as not being in accordance with the mechanism shown.

Q. 176. By Mr. Westall: Referring now to Complainant's Exhibit U, about which you have heretofore testified, please state what the normal position of the valve in the auxiliary nozzle is.

Mr. Blakeslee: Objected to as indefinite and upon the same grounds as urged with respect to a similar question just directed to Exhibit V.

A. In a device constructed in accordance with Complainant's Exhibit U, the normal position of the valve in the auxiliary nozzle would be full closed, for the reason that said valve is rigidly connected to the casing of the oil dashpot which, under the influence of the springs shown, is constantly urged to move toward a closed position of said valve, and there being nothing shown on the drawing to impede such action as to extent.

Q. 177. By Mr. Westall: This drawing also, namely, Complainant's Exhibit U, appears to show a constant flow of water from the auxiliary nozzle. Please state whether under the construction of the exhibit referred to that would be an accurate representation of the operation of the device under ordinary normal operating conditions.

A. The discharge shown in Complainant's Exhibit U as taking place through the auxiliary relief nozzle can occur only as a transitory condition, such as would occur during an opening or closing movement of the valve of said auxiliary relief nozzle. It cannot be the normal position assumed by the valve of the auxiliary relief nozzle at the conclusion of governing action which displaced it from its normal position of fully closed.

Q. 178. Please now state in what respect, if at all, the results accomplished by the operation of the main gate and by-pass as described by Lyndon, differs from that of the main and auxiliary nozzles illustrated in Complainant's Exhibits U and V.

Mr. Blakeslee: Objected to as indefinite, and as leading and suggestive. Let the witness compare the two things covered or attempted to be covered by the question.

A. The Lyndon specifications and drawings disclose main water-wheel gates capable of being operated either in one direction or the other, a by-pass valve so connected that as the main water-gates are operated in one direction or the other, the said by-pass valve is reversely operated. To accomplish the purpose of such construction, it is necessary that the by-pass valve be in a partly open condition as its normal position, in order to be ready for a succeeding action. This involves the provision of a quantity of water flowing through the by-pass sufficient to supply to the wheel such a quantity of water as would correspond with an increase in the load. It likewise involves the provision of such possible movement in the by-pass valve as would take care of

water rejected by the wheel on decrease of load. The declared principal object disclosed in the Lyndon patent is to provide unchanging flow and pressure in the main conduit during governor action. In the device shown in Complainant's Exhibits U and V, there is shown a main nozzle arranged to discharge water towards the wheel, controlled by a needle valve, and an auxiliary relief nozzle arranged to discharge water freed of the wheel, likewise controlled by a needle valve. The movement of the needle in the main nozzle is made responsive to changes in demand for water, and the movements of the valve in the auxiliary relief nozzle is made responsive especially to a rapid closing movement of the valve in the main nozzle when moving in the portion of its stroke near the closing point, the arrangement of the parts connected with the valve of the auxiliary relief nozzle being such that at the conclusion of the displacing action following a sudden closing action of the valve of the main nozzle, the valve of the auxiliary relief nozzle will slowly close to a fully closed position, the main object of this device being to prevent excessive and injurious pressure increases in the main conduit, at the same time permitting a minimum possible waste of water. The device is proportionate in such manner that during the closing movement of the valve in the main nozzle throughout the part of its stroke nearest its full open position, the response of the valve in the auxiliary relief nozzle will be slight or absent. On the other hand, on closing movements of the valve in the main nozzle during that portion of its stroke near its closed position, the response to the valve of the auxiliary relief nozzle

is more complete. Also, during a slow closing movement of the valve in the main needle nozzle during any part of its stroke, there will be no response on the part of the valve in the auxiliary relief nozzle, such response not being required as the said slow movement of the main needle valve produces no injurious pressure increases in the main conduit, the essential idea in the Lyndon patent being a constant velocity and pressure in the conduit during governor action, regardless of water economy; and in the mechanism shown in Complainant's Exhibits U and V being primarily economy of water, as far as it may be accomplished without injurious pressures in the main conduit.

Q. 179. By Mr. Westall: Please state whether or not every changed position of the needle of the main nozzle is followed by an inverse movement of the needle of the auxiliary nozzle in a device constructed in accordance with Complainant's Exhibits U and V.

A. In a device constructed in accordance with Complainant's Exhibits U and V, there is an inverse movement on the part of the valve of the auxiliary relief nozzle when the valve of the main nozzle closes rapidly, and especially when it so closes in that portion of its stroke nearer its fully closed position. On an opening movement of the valve of the main nozzle there is no response in any direction on the part of the valve of the auxiliary relief nozzle.

Q. 180. Please state how the operation which you have described in your last answer differs from that contemplated by Lyndon.

A. The Lyndon specifications and drawing describe

and show such an arrangement of parts that there is an inverse movement on the part of the by-pass valve following movement of the main gate either in an opening or a closing direction, whereas in the device in Complainant's Exhibits U and V this reverse action occurs only under certain conditions during closing movement of the valve of the main nozzle and not at all on the opening movement of said main valve.

Q. 181. I now call your attention to the written and printed names or designations of the various parts on Complainant's Exhibits U and V, and ask you to state whether or not such names are appropriate to the parts to which they are given, and, if not, to explain in what respect they are inaccurate, or in what respect some other term would be more appropriate, giving your reasons for any opinions as to the use of terms you may express.

A. The descriptive titles on Complainant's Exhibits U and V correctly represent the parts to which they are applied, with the exception that the auxiliary relief nozzle is designated "by-pass" and "by-pass valve" in both cases. The main function of this auxiliary relief valve being to afford opportunity for discharge of a small quantity intermittently to prevent excess of pressure in the conduit, it is not a by-pass valve to the same extent that it would be if it were designed to discharge water at all times during the operation of the plant.

Q. 182. I now call your attention to Complainant's Exhibit W, and ask you if you understand the use, purpose and operation of such a device, and if so to please explain fully the same, stating your reasons in full for any conclusion that may be expressed by you.

(Note: The Examiner here records the fact that before answering the question the witness replaces the part on said Exhibit which, heretofore on the record, to-wit, at page 453, line 4, was noted as having been broken in transit while in the custody of the Examiner.)

Mr. Blakeslee: It is stipulated that the part substituted by the witness for the broken part is an exact counterpart of said broken part.

A. The teeth shown on the sliding rack engage the pinion before mentioned in discussing Complainant's Exhibits E to L, as forming a part and as being attached to and forming a part of the stem of the speed-sensitive element of the governor, said stem being provided at the upper end with a threaded portion in such manner that on movement of the pinion resulting from the sliding action of the rack the virtual length of said stem will be lengthened or shortened, thus affecting the location of the balanced valve, applying pressure fluid to the operating cylinder of the governor. The casing of the dashpot in this exhibit is attached by means of a pin to the slidable rack, the movement of the rack being restrained by means of levers at both ends under action of the tension of the spiral spring, the connections being such that the rack can move in either direction from its central position, and, when released, will be returned to said central position by the action of the spiral spring. Within the casing of the dashpot is a piston attached to the small rod having at its end a brass connecting piece which, when this part is assembled with the governor, is attached to certain levers receiving motion from the water-gate-operating shaft in one case, and the sliding

rack bar in the other. The cylinder of the oil dashpot is provided with an adjustable valve shown near one end of the cover of the casing. The function of this valve is to control the rate of flow from one side of the piston within the cylinder to the other, responsive to the movement of the piston, the action being that with this valve full closed and on movement of the piston imparted by the gate-operating parts, response of the casing is complete; and as this valve is opened more and more, the response of the casing will be less and less complete, resulting in a greater and greater slip as between the two movements. The response of the casing to the movement on the part of the piston is effected principally by the nature of movement of the said piston. In other words, the response will be more complete the more rapid the movement of said piston, and less complete for a slow movement of the piston. The operation of the mechanism thus far described is: starting from a central position on the part of the slidable rack, and following the movement of the water-gate-operating parts, the piston within the casing will be moved, and, in accordance with the nature of that movement, the rack will be displaced from central position to a greater or a less extent, and in the same direction as the piston moved. On completion of the governor action, when the piston has ceased moving or has somewhat closely approached that condition, the tension of the coil springs exerting pressure on the slidable rack will tend to return it to its central position at a rate governed by the amount of opening in the adjustable valve. The arrangement of parts between the gear-teeth on the slidable rack through the pinion on the governor stem to

the balanced valve which originally set this mechanism in action, is such that the first movement of the rack tends to return said balanced valve to its neutral position. The effect resulting from the energy exerted by the coil spring on the slidable rack, acting on the casing of the dashpot and tending to cause flow of oil from one side of the piston to the other, is that the slidable rack will start to return to its central position before the piston within the dashpot has completely stopped, and the subsequent action of the slidable rack on its return movement to central position is made to agree as closely as possible in time with the return of the governor speed-sensitive part to its normal position, the object, in a general sense, of this movement being to counteract the lag in time which takes place between the initial governor action and the supply of the proper amount of water to the wheel. On a movement of the water-gate-operating parts slower than fixed by the relation between the tension of the spiral springs and the opening in the adjustable valve there will be no responsive action on the part of the dashpot casing, and no resulting action on the slidable rack. This is so arranged for the reason that slow movements on the part of the gate-operating parts do not require this counter-acting feature. Rigidly attached to the portion of this mechanism in which the rack is slidable, and thereby also rigidly attached to the fixed portion of the governor head, is a part numbered 2975, provided at one end with a pin which engages a part numbered 2974. Forming part of the piece numbered 2974 is a double inclined plane forming a sort of a trough in the upper case of the said part.

Bearing in this trough is a pin slidable within a part placed above the said inclined planes and kept in its lowest position by means of a spring, attached at its upper end to the adjustable valve before described as controlling the passage of oil from one side of the piston to the other within the cylinder of the dashpot. As arranged, the inclined planes for the trough are immovably connected to the frame of the governor head, while the pin working on these inclined planes is attached to the case of the oil dashpot. The operation of this device is that on displacement of the casing either in one direction or the other, resulting from movement of the piston, the size of the opening in the adjustable valve will be increased, thereby permitting a freer flow of oil, resulting in a greater lag between the piston movement and movement of the casing of the dashpot. This change in area of the regulating valve and in the slip between the two members of the dashpot is relative to movement of the said casing in either direction from central position. The sole object and effect of this variable control is to modify the slip between the two elements of the dashpot throughout the various parts of the movement. It is evident that should this double inclined plane be altered to a horizontal plane, said movement would produce no result in that direction, and the operation would be the same as though the mechanism were absent. On the other hand, should these inclined planes be reversed, making the high point in the center, the slip would be less and less as the movement approached the limit. The device last described is analogous in objects and results to a series of adjustable valves placed within the cylin-

der. It is always in operation during movement of the cylinder casing and has the following effect: on a rapid movement of the gate-operating parts in either direction, resulting in a greater displacement of the cylinder casing, the tendency of the cylinder casing to follow the piston is checked by the increase in the opening of the regulating valve, thereby resulting in a lessened degree of movement on the part of the casing, and consequently a quicker return to central position. The automatic feature of this controlling dashpot valve provides a means for adjusting the nature of the slip between the piston and the casing to suit the conditions in any particular plant. In some cases the automatic feature is omitted on advice of the designers and constructors of the mechanism.

Q. 183. By Mr. Westall: Mr. Berry, I believe you have testified that you have had no experience as an electrical engineer. I will now ask you to state what experience you have had which enables you to so thoroughly and completely explain the operation of the electrical features of the device of the Lyndon patent in suit and which enables you to so conclusively demonstrate their impracticability.

Mr. Blakeslee: We object to counsel so unequivocally sanctioning and endorsing the testimony of the witness, as we believe that is the function of the Court to perform, and we therefore object to the question as assuming a great many things which we shall attempt to show are not to be assumed, and as placing a construction upon the testimony which should be placed by a consideration of the testimony without any such sweeping endorsements.

ask you to compare the device of the Lyndon patent in suit with the devices shown and disclosed in the exhibits I have mentioned, describing the operation of the various parts of each device, for the sake of comparison, and explaining fully what differences you find in the operations and results effected thereby.

A. Complainant's Exhibits E to L inclusive, and U, V and W, show a water-wheel supplied with water by a needle nozzle, an auxiliary relief nozzle supplied with water when demanded through a conduit attached to the

A. I was for more than two years employed by the Electrical Engineering Company of this city, during which time they were engaged in developing their type of electric elevators in which electric circuits and solenoids were extensively used, and during that time I had ample opportunity to study the action of such devices and to understand thoroughly their action.

Q. 184. By Mr. Westall: Was your employment such at that time as to require you to study and understand the operation and uses of such devices?

A. It was such that it was necessary for me to understand such devices. The electric elevator at that time was in process of development, and many experiments were made to obtain the best form of apparatus to use. During that time also the determining experiments were made in the shop of the Electrical Engineering Company in connection with the installation and use of an electrically operated bell placed on Mile Rock at the entrance to San Francisco harbor. This mechanism involved the use of solenoids.

Q. 185. Referring now to Complainant's Exhibits E to L and Complainant's Exhibits U, V and W, I will

main conduit, a speed-sensitive governor with connections controlling the admission of oil under pressure to a cylinder containing a piston which by its movement in one direction or the other will open or close the main needle nozzle and, under certain conditions, will cause the reverse movement of the auxiliary relief valve. This device shows mechanical means throughout, except in the water-gate-operating part, which is in this case oil under pressure. The design and operation of this device is essential to provide power developed from flowing water in such manner that water will be economized to as great an extent as is permitted by the necessity of preventing excessive and injurious pressure rises in the main conduit, the mechanisms provided for the returning device overcoming the tendency of the various parts to overrun. This returning device is operated from and is responsive to the movement of parts directly operating the wheel gates, and it is especially responsive to the nature of such movement. The Lyndon patent in suit shows means for developing power from flowing water, and has an electric speed-sensitive element controlling through a secondary set of parts the application of the water-wheel-derived source of energy to the opening and closing of the water-gates, as well as the by-pass valve, the principal object, as expressed in the specifications, being to enable the water-wheel to be properly governed as to speed variation, and providing that there shall be no change in velocity, and, consequently, in the pressure within the main conduit during governor action. Economy of water is not mentioned or possible in this construction. The means employed are electrical and mechanical.

Q. 186. Referring now to Claim 1 of the Lyndon patent in suit, I will ask you to compare the combination of elements mentioned in said claim with the alleged infringing device as shown in Complainant's Exhibits E to L, inclusive, and U, V and W.

Mr. Blakeslee: Objected to as calling for a conclusion on the part of the witness, namely, necessitating on his part the interpretation of that portion of the Lyndon patent in suit coming within the metes and bounds set by Claim 1 thereof, and as not the proper method of proof.

A. Claim 1 of the Lyndon patent reads: "In a governor for water-wheels, the combination with a water-gate-operating shaft and a driving shaft." In the devices shown in Complainant's Exhibits E to L, inclusive, and in U, V and W, such water-gate-operating shaft may be found in the shaft D, shown in Exhibits F and U, and in the shaft L L, shown in Exhibits H and V. A driving shaft is not found except as the main water-wheel-shaft may be so considered.

"Of a reversing clutch-gear, adapted to connect the water-gate-operating shaft to the driving shaft in reverse driving relations." I find in the exhibits mentioned no such clutch-gear.

"Means for reversely controlling the operation of such clutch-gear." The clutch-gear being absent, the means of controlling the same must also be absent.

"A dynamo connected to be driven from the water-wheel and wound to maintain constant potential for varying currents therein, but to vary the potential in a greater ratio than the speed." There is in the exhibits mentioned no such dynamo.

“An electromagnetic device connected to such dynamo and controlling the clutch-gear-controlling means. And means for resisting the action of said electro-magnetic device in such manner that at normal speed the clutch mechanism will be disengaged, but on increase or decrease from normal speed the clutch will be operated to govern the water-gate through its operating shaft.” Such parts are missing from the exhibits mentioned.

Q. 187. By Mr. Westall: I will now ask you to make the same comparison with the combination of elements mentioned in Claim 2 of the Lyndon patent in suit.

Mr. Blakeslee: The same objections as last noted.

A. Claim 2 of the Lyndon patent in suit reads as follows: “If a governor for water-wheels, the combination with a water-gate-operating shaft and a driving shaft.” Such water-gate-operating shaft may be found at D in Exhibits E and U and at L L as shown in Exhibits H and V.

“Of a reversing clutch-gear adapted to connect said shafts in reverse driving relations.” I find no such reversing clutch-gear in the exhibits mentioned.

“Electromagnetic means controlling such clutch-gear.” Such electromagnetic means are likewise absent in the exhibits mentioned.

“A dynamo connected to be driven by the water-wheel and wound so as to deliver an electromotive force varying in a greater ratio than the speed in the water-wheel.” There is shown in the exhibits mentioned no such dynamo.

“A solenoid connected to said dynamo.” There is no such solenoid in the exhibits mentioned.

“And a device controlled by said solenoid and carrying a contact device.” Such device is missing in the exhibits mentioned.

“And energizing connections for the electromagnetic gear-controlling means, controlled by said contact device.” Such parts are completely missing in the exhibits mentioned.

Q. 188. By Mr. Westall: Please now make the same comparison with the combination of elements mentioned in Claim 3 of the Lyndon patent in suit.

Mr. Blakeslee: The same objections as last noted.

A. Claim 3 in the Lyndon patent in suit reads as follows: “In a water-wheel governor the combination with a water-gate-operating shaft and means for operating same in either direction to govern the water-wheel.” In the exhibits mentioned such water-gate-operating shaft may be found at D in Exhibits E and U, and at L L in Exhibits H and V.

“Means for operating same in either direction to govern the water-wheel” may be found in the cylinder W shown in Exhibit G, and in the cylinder F F shown in Exhibit H, together with the valve controlling the admission of the pressure fluid thereto.

“Of a controller for said operating means, responsive to changes of speed of the water-wheel.” Using the word “controller” in its general sense—something which controls—we find this only in such general sense in the speed-sensitive elements on the governor.

“A returning device for said controller provided with a clutch connection to said operating-shaft.” I find no returning device provided with a clutch connection.

There is a returning device differently connected and operated.

“And means actuated by said controller on movement thereof from normal position to engage said clutch with the said shaft, so as to cause the return of the controller to normal position and interrupt the governing action before it has overrun the proper amount.” I can find no such means in the exhibits mentioned.

Q. 189. By Mr. Wsetall: Please now make the same comparison with the combinations of elements described in Claim 4 of the Lyndon patent in suit.

Mr. Blakeslee: The same objections as last noted.

A. Claim 4 of the Lyndon patent in suit reads as follows: “In a water-wheel governor, the combination with a water-gate-operating shaft.” We find such water-gate-operating shaft at L L in Exhibits H and V and at D in Exhibits U and F. Likewise, a shaft shown in Exhibit G at X, which may be considered as such water-gate-operating shaft, inasmuch as it is directly connected to the shaft D and moves said shaft D in direct proportion to its new movement.

“A driving shaft and reversing clutch-gear adapted to turn the water-gate-operating shaft in either direction.” There is a driving shaft in the Exhibits shown, inasmuch as the main water-wheel shaft may be so considered. There is, however, no reversing clutch-gear adapted to turn the water-gate-operating shaft in either direction.

“A controller, responsive to changes of speed of the water-wheel and controlling such reversing-gear.” A controller in the very broad sense is found in the exhibits

mentioned in the speed-sensitive elements of the governor.

“And a returning device for said controller provided with actuating means controlled by said controlling means to return the controller to inoperative position, so as to prevent excessive movement of the governor.” I find in the exhibits mentioned a returning device which is, however, not actuated directly by the controlling means, but is responsive specially to the nature of the movement of the water-gate-operating shaft.

Q. 190. By Mr. Westall: What have you to say as to the term “electromechanical” as used in the title of the Lyndon patent in suit and in the first paragraph of the specifications as descriptive of the device shown and disclosed by Lyndon and that illustrated in Complainant’s Exhibits of the alleged infringing devices?

A. The term “electromechanical” used in the title of the Lyndon patent in suit No. 695220 and in the first paragraph of the specifications, describes the device as shown in the drawings and specifically explained in the specifications, inasmuch as the controlling elements are electrical and the gate-operating parts are mechanical in their nature. Such word, however, does not describe the devices shown in Complainant’s Exhibits mentioned, inasmuch as there is no electric feature involved, the means being strictly mechanical as to the speed-sensitive parts and mechanical and hydraulic as to the other operating parts.

Q. 191. What do you understand by the term “clutch-gear”?

A. The term “clutch-gear” in mechanics is applied

to a device usually composed of two main parts, one of which is rigidly connected to, for instance, a shaft, and the other slidably connected to the same or another shaft, and adapted to connect the fixed portion of the device to an otherwise disconnected member on the same shaft or to a second shaft. The common form of "clutch-gear" is known as the "jaw-clutch", using projections in one part and corresponding depressions in the other, arranged in such manner that when these two parts are moved together the projections will engage in the depressions and thus connect the two parts concerned. Modification of this is found in the friction-clutch which operates in the same general manner, except that the number of such projections and depressions may be considered as infinite, and the driving is done by the application of sufficient force between the two members to cause driving action by friction.

Q. 192. When you speak of "driving action" in connection with your definition of clutch-gear, state more fully what you mean.

A. By "driving action" used in my last answer, I refer to the effort on the part of one member of this clutch-gear to force the other in the same direction.

Q. 193. Then, if I understand you correctly, a clutch-gear is not only adaptable to connect and disconnect shafts, but for the transmission of energy from one rotating shaft to another?

Mr. Blakeslee: We object to counsel testifying without being sworn. The witness has been asked to define a clutch, and we assume that he is able, or supposed to be able, because he was asked to do so.

A. The principal object of the use of a clutch-gear is, by connecting one rotating shaft to another, to transmit thereto motion and power, and, reversely, by disconnecting such shafts to avoid such transmission of motion and power. It is a device ordinarily installed for the purpose of being able to accomplish this result when desired, and to omit it when not desired.

May 4, 1914. A. M.

Q. 194. In the testimony of complainant on his own behalf he has pointed out the cylinder F F on Exhibits H and J, and the cylinder W of Complainant's Exhibit G. He states that the cylinders are the mechanical equivalents of the gears, the equivalent of the clutch is the valve or controller actuated from the fly-ball. This valve, he says, "is not shown in the figures by reason that it is contained within the body of the casing and can, therefore, not be seen." (Record page 215.) Later on he says "the clutch-gear consists of a cylinder and its connections, and the controlling valve and its connections." He says the cylinder includes the piston and the piston head, "connections" include in addition to the piston a piston head, "parts for the controller valve", and then "power fluid". On further answering the question as to what constitutes the clutch-gear, he adds (record page 216) "the mechanical connections between said piston rod and water-gate-operating shaft indicated, for example, in Exhibit H by the rack and quadrant mounted on the shaft H H, the lever mounted thereon, the connecting rod I I, the lever K K mounted on the water-gate-operating shaft L L." I will ask you to state whether any of those elements or any combination of all or any part of those ele-

*St. Berry recalled
direct examination resumed
by Mr Westall*

ments performs the same function as a clutch or clutch-gear, and, in answering, please state fully your reasons for any opinion you may express.

Mr. Blakeslee: Objected to as indefinite and incomplete, and calling for a mere conclusive definition by comparison, and not for a comparison of any of the constructions concerned in this issue. The question is particularly incomplete in that it omits to define the relation between the parts mentioned and the work to be performed thereby.

A. Referring to Complainant's Exhibits H and J, especially to the power cylinder F F shown thereon, together with the controlling valve used to control the flow of power fluid in the said cylinder, and to the power cylinder W shown on Complainant's Exhibit G, together with the balanced valve controlling the admission of pressure fluid to said cylinder, I find nothing whatever in the nature of what is known as a "clutch-gear." There is, however, a very distant analogy, inasmuch as the combination of cylinder and valve is used to produce motion tending to operate the water-gate-operating shaft. The term "clutch-gear" in mechanics has fairly defined limits and has never, to my knowledge, been applied to such a combination of hydraulic cylinder and its controlling valve; and if so applied in the course of our ordinary business, we would consider it had been totally misapplied.

Q. 195. By Mr. Westall: Could the elements, or any part of the elements, mentioned in the last question be ever used to perform the function of a clutch-gear?

Mr. Blakeslee: Objected to as leading and suggestive and not the proper method of proof.

A. The combination of power cylinder with its controlling valve and power fluid could not be so applied as to perform the function of a clutch-gear. The movements belong to entirely different classes in mechanics, and I cannot see any situation where they would or could perform the same functions.

Q. 196. By Mr. Westall: In answer to question 226 of the record, page 216, Mr. Henry, after pointing out in answer to question 226, as part of the equivalent of the reversing clutch-gear, in Exhibit H the rack and quadrant mounted on the shaft H H, the lever mounted thereon, the connecting rod I I, the lever K K mounted on the water-gate-operating shaft, in answer to question 227 he corrects himself by saying: "In my last three answers I have gone further than specifying the elements which you have now asked. * * * The reversing clutch-gear * * * I will say, is contained in the power cylinder F F, for example, of Exhibit J, its piston head contained therein and piston rod extending therefrom." Please state whether or not the combination of elements last mentioned by Mr. Henry are the equivalent of or perform the same functions as the clutch-gear of the Lyndon patent in suit.

Mr. Blakeslee: Objected to as leading and suggestive, and, furthermore, on the ground that if it implies that there is any correction by the witness Henry of his testimony, the testimony speaks for itself.

A. The parts last mentioned, namely, the power cylinder F F, together with piston head within said cylinder, the piston rod connected thereto, do not form a clutch-gear, nor do they in any manner perform the functions of a clutch-gear.

Q. 197. By Mr. Westall: Complainant, testifying on his own behalf, has pointed out the combination of (1) a piston, (2) a piston rod, (3) a cylinder within which the piston operates, (4) body of fluid contained therein, of the dashpot of the Lombard governor (answer to question 264, record page 224) as the equivalent of a "clutch" of the returning device mentioned in Claim 3 of the Lyndon patent. He also intimated by inclosing in a red circle on Complainant's Exhibit Z Z what he conceives to be the equivalent of a "means actuated by said controller on movement thereof from normal position to engage said clutch with said shaft, so as to cause the return of the controller to normal position and interrupt the governing action before it has overrun the proper amount" described in Claim 3 of the patent in suit. Please state whether you find included within the circle on Exhibit Z Z referred to any mechanism which may be said to be "actuated by the cylinder marked 'controller' on said exhibit" to "engage" an alleged equivalent of the clutch, namely, piston, piston rod, cylinder and fluid therein, of the dashpot, with the part designated on said exhibit as the water-gate-operating shaft, and please state fully your reasons for your answer.

A. I find within the red circle marked on Complainant's Exhibit Z Z no mechanism controlled in any manner by the part marked "Controller" on the same exhibit, being a balanced valve controlling the flow of pressure fluid to the operating cylinder, nor does the mechanism found within said circle serve to connect in any manner whatever those parts stated to be the equivalent of a clutch, namely, the piston, piston rod, cylinder and pres-

sure guide, with that part in said exhibit marked "water-gate-operating shaft." The controller mentioned is one element only of a circuit of action in this governor. Its function is to start other parts in motion. The mechanism shown within the said red circle responds only in the sense that there is motion in the cycle, its response being only measured by the amount of movement of the casing of the dashpot of the Lombard governor. Its function is to open more or less the valve controlling the flow of fluid from one side of the piston to the other, at different parts of the movement of the said casing. It performs that function on movement of the said casing in either direction, and does it irrespective of any other control whatsoever. The mechanism found within the red circle provides no function whatever in the way of connecting the piston with its rod, the cylinder and the fluid body, to that part marked the "water-gate-operating shaft." Connection between the piston and rod just mentioned and the water-gate-operating shaft is a fixed and definite one through the levers, links and quadrant gear shown on the drawing. The movement of the pistons follows at all times positively and directly that of the water-gate-operating shaft. The resulting movement of the dashpot casing in relation to the piston movement depends upon the relation of the opening regulating valve. The designers and manufacturers of this mechanism recommend that the automatic feature added for the purpose of controlling the amount of this opening be omitted from the governor entirely in order that the governor under those particular circumstances may perform its function more satisfactorily than with the said parts. It is added to the

governor solely for the purpose of furnishing a means for varying and controlling the movements of this part of the governor. In the case of such a motion the valve is adjusted by hand and the opening remains permanently fixed during operation. The parts given as being the equivalent of a clutch are always definitely connected and never disconnected.

Mr. Blakeslee: We ask that all that part of the last answer commencing with "The designers" be stricken out and withheld from consideration as not responsive to the question, and being a mere volunteer statement on the part of the witness. And, furthermore, as being not the best evidence. The directions and acts of the designers or manufacturers of the device under discussion are best to be interpreted by themselves. The witness has not qualified to give such testimony.

Q. 198. By Mr. Westall: In answer to question 269 (record page 226) Complainant in his testimony designated the equivalent of "actuating means controlled by said controlling means to return the controller to inoperative position so as to prevent excessive movement of the governor" of Claim 4, to be the spring and finger parts acting against the rack, which spring and finger parts are marked on Exhibit ZZ "Actuating means, Claim 4." Please state whether you consider that such spring and finger parts are the equivalent of said actuating means quoted above, as described in said Claim 4, and please give your reasons in full.

Mr. Blakeslee: Objected to as calling for a conclusion on the part of the witness and not for a comparison of structures and functions; as leading and suggestive, and as not the proper method of proof.

A. Those parts shown on Complainant's Exhibit ZZ marked "actuating means, Claim 4" are not controlled by that part of the same exhibit marked "controller", and as the returning means in the Lombard governor they form part, only, of the entire returning device. They are parts of the whole. The part specified in the Lyndon patent in suit in Claim 4 as being "actuating means controlled by said controlling means to return the controller to inoperative position" refers to the clutch parts 23 22, together with lever 24, and the electromagnet 32. In the parts marked "Actuating means Claim 4" of Complainant's Exhibit ZZ, there are none of the elements nor any of the functions as shown in the Lyndon patent under that name.

Q. 199. By Mr. Westall: I call your attention to the following language of Claim 3: "Means actuated by said controller on movement thereof from normal position to engage said clutch with said shaft, so as to cause the return of the controller to normal position and interrupt governing action before it has overrun the proper amount", and the language of Claim 4, "Actuating means controlled by said controlling means to return the controller to inoperative position so as to prevent excessive movement of the governor." Please compare the language quoted of the two claims mentioned and state whether or not it refers generally to the same or different mechanisms of the Lyndon patent in suit.

Mr. Blakeslee: Objected to in so far as it calls for the conclusion or interpretation of the patent and of those parts thereof being within the metes and bounds of Claims 3 and 4, and as leading and suggestive.

A. The quotations from Claims 3 and 4 refer generally to the same parts of the Lyndon patent in suit. The wording is somewhat different, inasmuch as in Claim 3 a clutch is apparently omitted from these means, whereas in Claim 4 it is part of these means.

Q. 200. By Mr. Westall: In your opinion then, is there any inconsistency in the testimony of complainant designating the parts inclosed in the red circle on Complainant's Exhibit ZZ as the "means actuated by said controller on movement thereof from normal position to engage said clutch with said shaft, so as to cause the return of the controller to normal position and interrupt the governing action before it has overrun the proper amount" of Claim 3, and in describing the spring and finger parts acting against the rack as "actuating means controlled by said controlling means to return said controller to inoperative position so as to prevent excessive movement of the governor of Claim 4"? Please state your reasons for any answer you may make.

Mr. Blakeslee: Objected to as being really cross-examination of the defendant's own witness, as the apparent tendency thereof is to establish an inconsistency as between the answers of the present witness, and as leading.

A. Inasmuch as "means" described in Claims 3 and 4 cover generally the same mechanism, there is a decided inconsistency in designating the parts within the red circle on Complainant's Exhibit ZZ as corresponding to such means in Claim 3 and as designating the parts marked "actuating means Claim 4" on the same exhibit as corresponding to said means in Claim 4 in the Lyndon

patent, especially in view of the fact that in Claim 4 said "means" includes clutch 22 23.

Q. 201. By Mr. Westall: In answer to question 307, page 243 and 244 of the record, Mr. Henry testified that Mr. Lyndon in the patent in suit was the first to add to the art two great and valuable principles of water-wheel government, namely, first, that of preventing an overrunning of the governor, and, second, the elimination of damaging effects damaging to the governing and damaging to the safety of the pipe-line. Please state from your knowledge of the art prior to September 13, 1900, the date of the Lyndon application, were those principles part of the art? In other words, had they ever been accomplished?

Mr. Blakeslee: Objected to as calling for a conclusion on the part of the witness, not the proper method of proof and in no wise a proper method of establishing what was or what was not known, and what was and what had not been concretely produced or embodied or operated at the time mentioned.

A. I will state that as a matter of general knowledge the preventing of overrunning on the part of the governor was accomplished by the Lombard governor, and, as a matter of specific and personal knowledge, that this same object was attained in the governor designed by the Girard Water Wheel Company and installed as a part of the plant owned by the Power Development Company, located on the Kern River near Bakersfield. In this plant the overrunning tendency was taken care of by the load-sensitive part of the governor which made it respond to those changes more quickly than a speed-

sensitive governor could respond. The response on the part of this governor was exceedingly prompt. In regard to the provision of means to prevent the development of excessive and dangerous pressures in the pipeline, the by-pass valve installed by the Girard Water-Wheel Company in the plant on the Kern River performed this function in a most complete and satisfactory manner. It did it, furthermore, with a constant flow of water such as was required at that plant, to preserve the prior rights to the flow of the river. The device used only such quantity of water, and, therefore, did not waste water under the conditions obtaining at that plant. It was a perfect means for accomplishing the desired result. There was no possibility, except by derangement of the parts, such as all machinery is subject to, that such excessive pressures could be produced. As in all well-designed plants, the possibility of such derangement was taken care of by the provision of secondary safety means which means, in this particular case, took the form of a large air chamber placed on the main pipe-line. Such air chamber was sufficient to prevent dangerous pressure changes in case of such derangement of those parts specifically provides for the prevention of pressure changes.

Q. 202. By Mr. Westall: At what date, to your knowledge, were the devices which you have described in the last preceding answer known to you and used?

Mr. Blakeslee: Objected to as indefinite, incomplete, and calling for a conclusion on the part of the witness, not the proper method of proof, and not calling for the best evidence, no foundation laid for the introduction of secondary evidence, and as predicated upon a conclusion pertinent to the word "used."

A. I can give no definite dates as to when the Lombard governor was first put into use. In regard to the governor used at Bakersfield, it had been designed and patented, according to my best recollection, before March, 1895, when I entered the employ of the Girard Water Wheel Company. In regard to the by-pass valve, forming a part of the equipment of the Bakersfield plant, this was designed, to the best of my recollection, during the early part of the year 1896. The particular part installed at Bakersfield was designed some time later, probably during the latter half of the year 1896.

Q. 203. By Mr. Westall: What is the best of your recollection as to when it was actually put in use?

Mr. Blakeslee: The same objections.

A. The governor and by-pass valve were in use on the American River in 1896. The same parts were put into use at the plant near Bakersfield to the best of my recollection in the early part of 1897, the exact date being unknown to me at present.

Q. 204. By Mr. Westall: Were you personally present at both plants at the time of their being put in use, as you have testified?

Mr. Blakeslee: The same objection.

A. I was personally present at both plants when these devices were used.

Q. 205. By Mr. Westall: You have mentioned in your previous testimony an installation at the Mammoth Bar Mine. Please state whether or not either or both of those two great principles of water-wheel government which are pointed out by Mr. Henry at page 244 as having been added to the art by Mr. Lyndon, first, preventing

overrunning of the governor, and, second, the elimination of damaging effects, damaging to governing and damaging to the safety of the pipe-line, were used in that installation, and in doing so please give exactly the date, as near as you can recollect.

Mr. Blakeslee: Objected to as calling for a conclusion upon the part of the witness, not the best evidence, no foundation laid for any introduction of secondary evidence, as leading and suggestive, and not the proper method of proof.

A. The governor developed by the Girard Water Wheel Company containing in its load-sensitive feature means for preventing overrunning, was installed in the plant at the mine of the Mammoth Bar Mining Company when the plant was originally placed there. The by-pass valve which absolutely prevented pressure variations in the pipe-line was added immediately thereafter on discovering that the exceedingly quick action of the said governor produced such severe pressure variations in the pipe-line as to make governing impossible, and as to produce dangerous pressures. I have no record of the exact dates on which these installations were made, but to the best of my recollection it was during the hot season of the year 1896.

Q. 206. By Mr. Westall: Had you any knowledge of the Lombard governor with its returning mechanism prior to September 13, 1900, and, if so, please state the extent of your knowledge prior to that date.

Mr. Blakeslee: Objected to as indefinite and incomplete in view of the previous testimony of the witness, and

as assuming the presence in the Lombard governor at that time of any returning device, and as leading.

A. My knowledge of the Lombard governor previous to the date mentioned was only of a general nature, as being part of the work being done along this line.

May 4, 1914—P. M.

Q. 207. I now call your attention to Defendant's

Exhibit French Patent and Defendant's Exhibit Translation of French Patent, and ask you to state whether or not the documents referred to show devices accomplishing those two great principles of water-wheel government which Mr. Henry says were introduced in the art by Mr. Lyndon, namely, (1), preventing the overrunning of the governor, and (2), the elimination of damaging effects, damaging to governing and damaging to the safety of the pipe-line.

Mr. Blakeslee: The objections heretofore registered with respect to this exhibit purported French patent, are repeated; and also understood to be repeated with respect to every question put to this or any other witness in connection with such exhibit, particularly on the ground that the purported French patent shows upon its face that it is not a patent, that it is not identified, and further, on the ground that the question places an arbitrary construction upon the testimony of the witness Henry, and also and further, as calling for a conclusion on the part of the witness, and as not the best evidence and not the proper method of proof, and as leading and suggestive.

A, Defendant's Exhibit French Patent and Defendant's Exhibit Translation of French Patent show a device for preventing over-running of the governor in the methods of construction by which a movement on the part of the piston within the cylinder are caused by a displacement of the valve t, following governing action, tends to return said valve t to its neutral position. This is accomplished by the provision of a floating fulcrum on the double lever u u moved in accordance with the movement of said piston s, and its rod v. The effect of this arrangement is that a small movement of the governor from its normal position is followed by a small movement on the part of the piston s, and a small movement on the part of the water-wheel gates. Also, that a large movement on the part of the governor is followed by a large movement on the part of the piston s, and a large movement on the part of the water-wheel gates. The provision for preventing excessive pressures in the pipeline are found in the by-pass valve b forming part of the differential piston b operated as before described, by the double lever J attached to the piston rod v. This by-pass valve b is made to open on a closing movement of the main water-wheel gates which specially tend to produce the severe pressure increases which may become dangerous. I therefore find that the French patent mentioned contains mean for preventing the overrunning of the governor which is necessary to secure successful governing, and that it contains also means for preventing excessive and dangerous pressure increases in the main conduit.

Q. 208. By Mr. Westall: Referring now to Defendant's Exhibit Swiss Patent and Defendant's Exhibit Translation of Swiss Patent, I will ask you to state whether or not there is disclosed in the devices therein shown and described any mechanism for accomplishing the two great principles of water-wheel government which Mr. Henry testifies were introduced by Mr. Lyndon into the art, namely, the prevention of overrunning of the governor and the elimination of damaging effects, damaging to the governing and damaging to the safety of the pipeline.

Mr. Blakeslee: The same objections are repeated as last noted, and the further objection that this purported Swiss Patent which on its face is shown to be a copy, is not within the pleadings of this case, not being set up in the answer filed by the defendant.

A. Defendant's Exhibit Swiss Patent and Defendant's Exhibit Translation of Swiss Patent show means for preventing the overrunning of the governor to the end that ~~the~~ governing may be successful, in the arrangement of the double lever shown as being attached at its one end to the governor m and at its other end to the stems f2, forming part of the piston f and connected at an intermediate point to the valve n controlling the admission of pressure fluid to the chamber o. The effect of this arrangement of parts is that a displacement of the valve n by the governor is counteracted by the movement of the piston f, which tends to return the valve n to its

normal position. The provision for preventing excessive and dangerous pressures in the pipe-line we find in the by-pass *c*, controlled by the valve *g*, which by-pass valve is opened on a closing movement of the main water-wheel gate *d*, which contracts the area of the orifice *b* and which if not coupled with such relief action would produce excessive and possibly dangerous pressures in the pipe-line. I therefore find that Defendant's Exhibit Swiss Patent contains both the means for preventing the overrunning of the governor to the end that governing may be successful, and also means for preventing excessive pressure rises in the pipe-line.

Q. 209. By Mr. Westall: I now call your attention to Defendant's Exhibit Wetmore Patent No. 519597, and ask you to state whether or not the device therein shown and described contains one of the great principles of water-wheel government which Mr. Henry testified was introduced by Lyndon into the art, namely, that of preventing the overrunning of the governor, and, if so, point out the device disclosed for that purpose and the method by which the purpose is accomplished.

Mr. Blakeslee: The same objections last noted, unless it be as to the identity of the copy.

A. Defendant's Exhibit Wetmore Patent No. 519597 contains the device for preventing the overrunning of the governor to the end that governing may be successful. This is found in the arrangement of the sliding frame *h* having contact strips *g'* and *g2* arranged to be moved in one direction

by the stem h2 placed on the water-gate-operating shaft a, and to be moved in the opposite direction when permitted by the weight of h5 acting through flexible connection h3. The operation of this device is such that a movement of the water-gate-operating shaft following contact between the contact points G and contact strips g' or g2 forces or permits such a motion of the sliding frame H that this connection will be broken unless the indication on the part of the core E of the solenoids is such as to call for a further movement on the part of the water-gate-operating shaft. These movements form a follow-up device, and the result at any particular instant depends on which prevails over the other. I therefore find that the Wetmore patent mentioned contains a device for preventing the overrunning of the governor such as is necessary for successful governing.

Q. 210. By Mr. Westall: I now call your attention to Defendants C. S. English Patent, No. 521085, and ask you to state whether or not one of the great principles of water-wheel government which is stated by Mr. Henry to have been introduced by Lyndon into the art, namely, that of preventing overrunning of the governor, is shown and disclosed in the exhibit referred to, and explain your answer fully.

Mr. Blakeslee: The same objections as last noted.

A. Defendant's Exhibit C. S. English patent No. 521085 contains a device arranged to prevent the overrunning of the governor to the end that gov-

erning may be successful. This device consists of the drum 15 operated from the gate-operating shaft a to the belt b, pulley P2 and shaft b'. This drum operates or permits to be operated lever L' so arranged that the contact made at points 3 or 4 producing motion to the connecting means on the part of the water-gate-operating shaft a will be broken. This movement is a follow-up movement and whether this contact shall be broken at any particular instant or not depends on which of these movements prevails over the other, that of the water-gate-operating shaft or that of the core i of the solenoid Z. I therefore find that the patent mentioned contains a device preventing overrunning of the governor in order that governing may be successful.

Q. 211. By Mr. Westall: Referring now to Complainant's Exhibit A, being the Lyndon patent in suit, and particularly to Claim 5 thereof. I will ask you to compare the combination of elements therein described with that of the alleged infringing structures as shown in the photographs and drawings to which you have heretofore referred.

Mr. Blakeslee: Objected to as calling for a conclusion on the part of the witness in the nature of an interpretation of that part of the patent coming within the metes and bounds of Claim 5 thereof, and as leading and suggestive, and not the proper method of comparison or of proof.

A. Comparing the combination of elements shown in Claim 5 in the Lyndon patent in suit No. 695220 with the alleged infringing device, I find that

the combination of parts shown in said Claim 5 cannot be found in the said alleged infringing device, for the reason that I find in that device no reversing clutch-gear, no dynamo especially wound and connected as described in Claim 5, no solenoid energized by said dynamo, no core for said solenoid, no circuit controller actuated thereby, no two electro-magnetic devices for reversely operating the clutch-gear, no clutch adapted to bring said returning devices into operative connection with the water-gate-operating shaft, no magnet controlling said clutch, no circuit for said magnet, no circuit closer. I also find that in the underlying nature of these two devices there are important and vital differences, inasmuch as in the device shown in the Lyndon patent the movements are set in action by electric contacts, which are, therefore, instantaneous in their nature, and that these movements have no relation with the nature of ^{said} the speed change, and that the rate of movement following said contacts is not dependent in any way on the nature of said speed change, that there is no means provided for controlling the rate of these movements or any means for definitely terminating these movements depending on the amount and nature of resulting movement of the water-gate-operating shaft; while in the device shown in the alleged infringing mechanism the movement of the water-gate-operating shaft is slow or fast, according to the nature of the speed change. When the speed is slow and gentle, the movement of the water-gate-operating shaft will be

likewise slow and gentle. On the other hand, should the change be more violent, the movement of the water-gate-operating shaft will be more violent. In the Lyndon patent the operation of the return device is set into operation instantaneously, is not dependent in any sense upon the nature of the speed change except that as the speed change is more violent this device will be set into operation in less time, if there be any difference whatever in the time element. In such a case, when there is a slow speed change, calling for a slow water-wheel-gate change, the returning device will be set into operation instantaneously. On the other hand, should there be a violent speed change, this returning device will be set into operation within even less time, if that be possible, whereas the operation of the water-gate-operating shaft, being fixed as to its rate, calls for a long time to accomplish the purpose. In the alleged infringing device the arrangement of the returning device is such as to be responsive principally to the nature of the movement of the gate-operating parts. Should this movement of the water-gate-operating part be slow, the response of the returning device will be slow or absent, depending upon the rate of said movement. On the other hand, should the movement of the water-gate-operating shaft be rapid, the response on the part of the returning device will be more complete, being thereby in accordance with the displacement of the balanced valve which originally sets into motion the described rapid change. This difference between

the two devices is fundamental, and of exceeding importance, and constitutes, in my mind, the principal reason why the device as shown in the Lyndon patent cannot be operative, and the device shown in the alleged infringing mechanism is successful.

Q. 212. By Mr. Westall: Please now compare the combination of elements described in Claim 8 of the Lyndon patent in suit with the alleged infringing devices as shown in the photographs and other exhibits to which you have referred in giving your previous testimony.

Mr. Blakeslee: The same objections as last noted.

A. Comparing Claim 8 of the Lyndon patent in suit, No. 695220, with the mechanism shown in the photographs and other exhibits describing the alleged infringing device, I find that the combination of parts shown in Claim 8 does not exist in said infringing devices, for the reason that I do not find in said alleged infringing device "a valve for such by-pass normally held in partly open position," no "clutch adapted to connect said operating device for the by-pass valve with the water-gate-operating shaft," nor any "means operated by said controller bringing the aforesaid clutch into operation and to release said clutch when governing action is effected." The same remarks apply in this comparison as were added to the preceding, concerning the general nature of the operation of the parts shown in the two devices.

Q. 213. By Mr. Westall: Please compare the

combination of the Lyndon patent in suit in Claim 7 of the Lyndon patent in suit, with the alleged infringing devices as shown in the photographs and drawings to which you have referred in your previous testimony.

Mr. Blakeslee: The same objections as last noted.

A. Comparing the combination of elements shown in Claim 7 of the Lyndon patent in suit, No. 695220, with the device illustrated in the various photographs and drawings of the alleged infringing device, I find that the combination of elements shown in Claim 7 does not exist in the alleged infringing device for the reason that I do not find in such alleged infringing device any "means connected to the water-gate-operating means and adapted to operate the by-pass valve from normal position in either direction so as to control such valve inversely to the control of the water-gate." This element is absent from the alleged infringing device for the reason that the automatic relief nozzle used in connection with that device is not operated from normal position in "either direction," but in one direction only, and that when the main water-gate is closed.

Mr. Blakeslee: The attention of the Court is called to the fact that in this answer the witness has apparently intentionally terminated his reference to a certain element or portion of Claim 7 short of a complete statement of that element and its operation.

Q. 214. By Mr. Westall: State whether or not a movement of the water-gate in closing direction is always followed by an inverse movement of the needle of the auxiliary nozzle in the alleged infringing devices.

Mr. Blakeslee: Objected to as grossly leading and suggestive, and as a quotation from the *prima facie* case.

A. The arrangement of the various parts of the dashpot connected with the auxiliary relief nozzle in the alleged infringing device is such that a closing movement on the part of the valve of the main needle nozzle when slow produces an effect on the action of the valve of the auxiliary relief nozzle, especially when the valve of the main needle nozzle is operating in that part of its range nearest its full open position. The response of the valve of the auxiliary relief nozzle is especially in accordance with the nature of the closing movement of the valve of the main needle nozzle, a rapid movement on the part of the latter in closing direction producing a more prompt response on the part of the valve of the auxiliary relief nozzle.

Q. 215. By Mr. Westall: Suppose that the operation of the Lyndon by-pass and main water-gate could be made to move by some operative mechanism as Mr. Lyndon says they will move. Please compare the operation and effect of the main and auxiliary nozzles of the alleged infringing device with the action of the main water-gate and by-pass of the Lyndon patent.

Mr. Blakeslee: Objected to as based upon an assumption that the structure of the Lyndon patent will not produce the effects therein described, the patent disclosure being presumptively operative instead of the contrary.

A. Assuming that the devices shown and described in the Lyndon patent No. 695220 will operate as he intended, we find that the by-pass valve will be normally in half or part open position as its normal position. By "normal position" I mean that position to which the by-pass valve is returned at the conclusion of governing action so as to be ready for succeeding action. This arrangement is made as described by Mr. Lyndon so that additional water required by the water-wheel on increase of load can be promptly supplied from that which has been flowing through the by-pass valve, and, on the other hand, that the by-pass valve will provide escape for the water rejected by the water-wheel on a reduction of load. The objects described in his specifications require that this flow shall take place at all times except when the by-pass valve has been fully closed as the result of the heavy demand on the part of the wheel for additional water, from which closed position, however, it promptly returns to its normal position of half open. This device, therefore, requires that there shall be a flow of water through the by-pass under normal conditions. The amount of this waste water will depend upon the capacity of the by-pass valve in relation to the capacity of the water-wheel. The specification states

clearly that the capacity of this by-pass is a small percentage of the capacity of the water-wheel. Under such conditions the amount of load variation which the by-pass can properly take care of is likewise limited to a small percentage of the wheel capacity, the waste being under normal conditions one-half of the capacity of the by-pass, which waste is added to the amount of water being used by the wheel at all times. Should this by-pass be made of sufficient capacity to take care of full load variations, there will necessarily be flowing to waste through the by-pass an amount of water equal to that demanded by the wheel at full load, so that when the water-wheel is operating at full load, and the by-pass valve has resumed normal position following governor action, the plant will be using twice as much water as would otherwise be required to operate the wheel at full load.

In the arrangement of parts shown in the alleged infringing device, we find that the normal position of the automatic relief nozzle is fully closed, and that it is moved from its normal position only when the nature of the reduction in load on the water-wheel demands a prompt closing of the valve of the main needle nozzle. A slow load decrease produces no action on the part of the auxiliary relief valve, nor does an increase of load requiring an opening of the main needle nozzle produce any result thereon. The object of this device is evidently to prevent excessive and dangerous pressure rises in the main line, and, at the same time, to permit that vi-

tally important feature of water-power plants, namely, economy in the use of water. This in a great majority of plants is the feature which determines the feasibility of making the installation at all, and many thousands of dollars are spent to this end. In modern plants it is rapidly becoming the most important factor to be considered, and it will become of greater importance as available sources of water power are more and more utilized. It likewise has an important bearing on the cost of installation, as to the utilization of every dollar expended. We see, furthermore, in the Lyndon device that when carried to a full realization of the aims and objects of the specification that the cost of installation in such parts as are concerned in the supply of water to the unit will be very greatly increased over the cost of such parts required to furnish no more water than is required by the water-wheel at full load, and that this increased cost, so far as providing available power is concerned, is wasted, the sole effect being to allow steady flow and pressure in the conduit during governor action.

Q. 216. By Mr. Westall: Please now compare the combination of elements described in Claim 9 of the Lyndon patent in suit with those shown and illustrated in the various exhibits to which you have referred in your previous testimony as disclosed in the alleged infringing device.

Mr. Blakeslee: The same objections as recently noted with respect to a similar comparison, referring to Claim 8.

A. On comparing the combination of elements shown in Claim 9 of the Lyndon patent in suit No. 695220 with the alleged infringing device, I find that the combination of parts shown in Claim 9 does not exist in the alleged infringing device, for the reason that I find in such device no "valve for said by-pass normally held in partly open position", no "means adapted to operate such valve in either direction", no "clutch adapted to connect such operating means with the water-gate-opening^{val} shaft", no "reversing gear for turning the water-gate-operating shaft in either direction", no "dynamo connected to the water-wheel so as to be responsive to the speed thereof", no "electro-magnetic device connected to said dynamo", no "controller operated by said electro-magnetic device and controlling the said reversing gear", no "magnetic device controlling the aforesaid clutch for the by-pass operating means", no "circuit for said magnet and means operated by said controller in its movement in either direction to close such circuit". I find, furthermore, that the elements in Claim 9 comprising the "controller operated by said electromagnetic device controlling the said reversing gear" from a means, in the Lyndon patent, for controlling a secondary source of energy, which Lyndon found necessary to introduce in order to secure sufficient power to operate his reversing clutch-gear, and that there is at no place in the mechanism of the alleged infringing device anything corresponding to such parts. In the Lyndon patent this secondary source of energy is taken

from the speed-sensitive dynamo, but it is just as much a secondary source of energy as though it were derived from an entirely external source, inasmuch as he specifically provides in his description of this generator means for overcoming the effect of taking such power from the speed-sensitive dynamo. This is found on page 1, line 48, and reads: "A dynamo driven by the water-wheel and so wound that the electromotive force at the terminals is substantially independent of the load." The object of this provision is to permit taking off of this secondary source of energy without disturbing the speed-sensitive feature of his dynamo. Had this provision not been made the taking off of such energy at intervals would disturb the balance which he considers necessary to promptly and correctly indicate speed changes.

Q. 217. By Mr. Westall: You have heretofore compared the combination of elements of Claim 3 of the Lyndon patent in suit with the alleged infringing devices. I will now ask you to briefly summarize your conclusions as to whether or not the alleged infringing devices contain the combination as described in Claim 3.

Mr. Blakeslee: Objected to as not the proper method of proof and as necessitating the interpretation of Claim 3 and that portion of the Lyndon patent in suit stated therein, and not a comparison between definite structures.

A. Comparing the combination of elements shown in Claim 3 of the Lyndon patent in suit, No.

695220, with the combination of parts alleged in the infringing device, I find that the said alleged infringing device does not contain the combination of parts shown in Claim 3 of the Lyndon patent, for the reason that I find no "returning device for said controller provided with a clutch connection to said operating shaft", no "means actuated by said controller on movement thereof from normal position to engage said clutch with the said shaft so as to cause the return of the controller to normal position and interrupt the governor action before it has overrun the proper amount". There is in the alleged infringing device nothing ^{of} in the nature of a clutch as shown in the Lyndon patent and as generally understood in mechanics.

Q. 218. By Mr. Westall: Please now summarize your comparison of the combination of elements described in Claim 4 of the Lyndon patent in suit with the alleged infringing device as illustrated in the exhibits which you have ^{heretofore} hitherto referred to.

A. Comparing the combination of elements shown in ~~claim 4 of~~ the Lyndon patent No. 695220 with the parts of the alleged infringing device, I find that the said alleged infringing device does not contain the combination of elements shown in Claim 4 of the Lyndon patent, for the reason that I do not find therein a reversing clutch-gear as shown in the Lyndon patent and commonly understood in mechanics, nor any "returning device for said controller provided with actuating means controlled by said controlling means to return

the controller to inoperative position so as to prevent excessive movement of the governor". The mechanism shown in the alleged infringing device and which serves the purpose of a returning device is controlled specially by the nature of the movement of the water-gate-operating shaft, and not as an instantaneous and positive result of movement on the part of the controlling means.

Q. 219. Mr. Henry has pointed out the part marked "controller" on Complainant's Exhibit ZZ as the mechanical equivalent of the solenoid 33 of the Lyndon patent in suit. Please compare the two devices mentioned as to functions performed and as to results accomplished, and state whether or not you agree with the conclusion as expressed by Mr. Henry, stating your reasons in full for any opinions you may express.

A. Making a comparison between the parts marked "controller" on Complainant's Exhibit ZZ and the solenoid 33 as shown and described in the Lyndon patent, I find absolutely no analogy between these parts either in function or result. The part marked "controller" in said exhibit is a balanced valve controlling the admission of pressure fluid to the power cylinder. As such, it directs the flow of energy either in the one direction or the other, which moves the water-gates. Whereas the solenoid 33 of the Lyndon patent is an inseparable part of the dynamo 8, acts only with it, and has for its function movement of the core 34 and through it the lever 26, which, by means of contacts 40 40a, or 41 41a, con-

trols the application of the secondary source of energy to the solenoids 15 or 16, which secondary source of energy is utilized for setting into operation the gear-reversing mechanism shown at 9 10 11 13. There is, therefore, not even an analogy in the means or the results of the operation of these parts.

Q. 220. Mr. Henry has pointed out the valves G on Complainant's Exhibits E and G, and at CC on Exhibit K and H, including the springs that separate the fly-balls, the rotating head by which they are rotated (record page 217), as performing the same functions as the "dynamo connected to be driven from the water-wheel and wound" in the manner set forth in the Lyndon specifications, and claims, stating that said fly-balls with the parts mentioned "perform the same functions as the electrical device in substantially the same manner" (answer to question 232, record page 217). Please state whether or not you agree with these conclusions, stating your reason for any answer you may give.

A. On comparing the fly-balls shown at G in Complainant's Exhibits E and G, and at CC in Complainant's Exhibits K and H, with the dynamo 8 shown on the Lyndon drawings and described in the specifications, I find not even an analogy of means nor any as to results, for the reason that said fly-balls with the springs and governor head, being responsive to speed changes of the wheel, indicate such responsiveness by a movement of a part of the governor stem, whereas the dynamo shown and described in the Lyndon patent makes no indication

whatever of its responsiveness to speed changes, it being necessary to employ other elements to make such indication. Furthermore, the means in one case are entirely mechanical and in the other electrical.

Q. 221. I will ask you to please compare the speed or speed-control of the operation of the main water-gate of the Lyndon patent with the needle of the main nozzle of the alleged infringing device.

Mr. Blakeslee: Objected to on the ground that no foundation has been laid, the witness not having testified to an examination of this nozzle or gate, to determine its speed, and as therefore calling for a mere conclusion or deduction or expression of opinion.

A. Comparing the speed of operation or the rate of movement of the main water-wheel gate in the Lyndon patent, responsive to its control mechanism with the same features of the alleged infringing device, I find that in the case of the Lyndon patent the speed of operation of these gates is the same at all times, being the result of definite mechanical connections between the main water-wheel shaft 3, through the gears 4, shaft 6, gears 9 11 or 10 11, the shaft 12, the worm 18, the worm-wheel 19, the shaft 20, the gears 21 21a and the shaft 21b connected to the water-wheel gates. This movement takes place or does not take place, depending upon whether the contacts are made or broken, the interval between the latter movements being practically infinitesimal, depending, as it does, upon contact or no contact in the electrical circuit. Furthermore, this movement

is at the same rate, regardless of the nature of the speed change which has taken place or which takes place in the dynamo 8 responsive to the change of speed in the water-wheel. As far as any differential action of these parts is concerned responsive to speed changes of the dynamo 8, the time element will be less with sudden speed changes than gradual speed changes; whereas in the former case the fixed rate of movement on the part of the water-wheel-operating parts calls for a longer interval of time to permit the required amount of gate movement, and in the latter case it requires a shorter time, the relation of the method of operation of the controlling parts of the governor being directly reverse of the movements demanded on the part of the water-wheel gate operating parts. Whereas in the alleged infringing device the construction and arrangement of the parts is such that the rate of movement of the valve of the main gate or nozzle is fast or slow, depending on whether the rate of speed change is fast or slow. In the case of heavy load changes producing a greater disturbance in the speed, the response of the valve of the main needle nozzle will be more prompt than in the case of slow load changes producing a less disturbance of speed. We find this graduated control in the alleged infringing device in the movements of the valve parts, and also in the movement of the returning device. It is this graduated control which makes possible the successful operation of the alleged infringing device. It is probably the most vital element in water-wheel governing.

Q. 222. By Mr. Westall: Please now make a similar comparison of the operation, effects and result of the by-pass of the Lyndon patent in suit and that of the auxiliary relief nozzle of the alleged infringing devices.

Mr. Blakeslee: The same objection.

A. Comparing the rate of movement of the by-pass valve as shown and described in the Lyndon patent with the same features of the automatic relief nozzle shown in the alleged infringing device, I find that the by-pass valve of the Lyndon patent is moved at a definite rate of speed responsive to movement on the part of the main water-wheel gate, and that this movement is set into operation by instantaneously operating electric contacts in such manner that this by-pass valve will open when the main water-wheel gate closes and will close when the main water-wheel gate opens, the declared intention of the specifications being that these movements shall be reversed in direction and proportionate in amount. In the automatic relief nozzle shown in the alleged infringing device we find that the valve is so arranged that it will respond to a closing movement of the valve of the main needle nozzle and especially to the nature of that movement, and particularly to the nature of that movement when it is operating through that part of its range nearer its closing position, and that a reverse movement on the part of the valve of the main needle nozzle produces no effect on the valve of the auxiliary relief nozzle. The response of the valve of the automatic relief nozzle is such that it

will successfully prevent excessive and dangerous pressure rises in the main conduit and at the same time will remain fully closed as much as possible in the attainment of this object, and will thereby cause the greatest possible economy in the use of water consistent with safety to the main conduit. The rate of movement is capable of being adjusted by the operator to suit the particular conditions of the plant in which it is installed, and when so adjusted will automatically take care of and prevent dangerous pressure increases. It is this graduated control which is of vital importance in the governing and in the safety of power plants.

Q. 223. By Mr. Westall: I now call your attention to the combination of elements mentioned or described in Claim 5 of the Lyndon patent in suit, being a "circuit for said magnet, including a circuit closer", and will ask you to point out in the Lyndon patent in suit where you find such an element.

Mr. Blakeslee: Objected to as calling for a fragmentary interpretation of the patent.

A. Referring to Claim 5 of the Lyndon patent in suit, No. 695220, and to that portion commencing at line 56, reading: "a circuit for said magnet including a circuit closer operatively connected with the aforesaid circuit controller, and adapted to energize said magnet on movement of the circuit controller in either direction", the said magnet is found at 32 in the Lyndon patent, the circuit for said magnet being circuit 102, the circuit closer operatively con-

nected with the aforesaid circuit controller being the lever 43 and the contacts 45 45a and 46 46a.

Q. 224. By Mr. Westall: Complainant testifying on his own behalf has pointed out what he conceives to be a mechanical equivalent for a "circuit for said magnet", being an element called for in Claim 5 of the Lyndon patent in suit, the rods marked by him "mechanical circuit Claim 5" on Complainant's Exhibit ZZ. Please state whether or not you agree with Mr. Henry's conclusions as to the identity of function or results performed by the parts indicated on the exhibit mentioned, stating your reasons in full for any conclusions you may express.

Mr. Blakeslee: Objected to in so far as it places a false construction upon the testimony of the witness Henry, and calling for a mere conclusion of the witness.

A. I do not even find a distant analogy as to the means or results as between the levers and links marked "mechanical circuit Claim 5" on Complainant's Exhibit ZZ, and the circuit 102 of the Lyndon patent. The said combination of levers and links being permanently connected means for transmitting motion between the water-wheel-gate-operating parts and that part of the Lombard governor known as a returning device, whereas the said circuit 102 of the Lyndon patent is a necessary but very minor part of his returning device. Its purpose is to transmit electric current which in itself gives no indication of such transmission and is not available for use without further parts and actions.

Q. 225. By Mr. Westall: Do you find that the element mentioned in Claim 5 referred to in the previous question has any connection with the water-gate-operating shaft of the Lyndon patent?

Mr. Blakeslee: Objected to as leading.

A. I find absolutely no such connection between the circuit 102 of the Lyndon patent, inasmuch as this circuit is a part of the speed control portion of the Lyndon patent, and is not connected in any way with the water-gate-operating shaft as an operating means for this work. It does not depend in any way upon the movement of the water-gate-operating shaft.

Q. 226. By Mr. Westall: Please state whether or not the parts marked "mechanical circuit Claim 5" on Complainant's Exhibit ZZ are connected in any manner to the part marked on said exhibit "water-gate-operating shaft"?

Mr. Blakeslee: The same objection.

A. The parts shown on Exhibit ZZ and marked "mechanical circuit Claim 5" are positively connected to the water-gate-operating shaft in such manner that as this shaft moves as the result of a movement of the piston in the power cylinder, said levers and links will move in direct proportion to the movement of said water-gate-operating shaft.

Q. 227. By Mr. Westall: Mr. Berry, prior to preparing the tracings from which the blueprint Defendant's Exhibit Berry Blueprint No. 1, illustrating the devices in use at Bakersfield in 1896 and 1897, were made, or at any time during the prepara-

tion thereof, did you communicate with M. Edward S. Cobb in any manner, or did you read the testimony or any part thereof that he gave, describing the construction, operation and effect of such devices?

A. Prior to the completion of the tracing from which the print marked Defendant's Exhibit Berry Blueprint No. 1 was made, I had not communicated with Mr. Edward S. Cobb for many years—probably about fifteen—nor had I read any part of his testimony concerning this plant.

Q. 228. Did you acquire any knowledge from any other source of what Mr. Cobb had testified to prior to or during the time of the preparation of said tracing?

A. I acquired no information whatever from any source as to Mr. Cobb's testimony in this case prior to the completion of said tracing.

Q. 229. So that the preparation of the tracing referred to was the result of your independent memory without any other aid than what you have previously testified to?

Mr. Blakeslee: Objected to as leading and calling for testimony once given. The witness testified about four days ago that the sources from which he worked were his knowledge and his memory.

A. The preparation of this tracing was made without further aid than my memory of the principles involved in the mechanism used, and the sources before mentioned in my testimony.

May 5, 1914, P. M.

*SL Berry recalled direct examination
resumed by Mr. Westall*

Q. 230. Mr. Henry, complainant in this action, has pointed out cylinder FF in Complainant's Exhibits H and J, and cylinder W of Exhibit G, with its piston head and piston rod, as the equivalent of the "reversing clutch-gear" of the Lyndon claims. Professor C. L. Cory, testifying for complainant, does not agree with the witness Henry as to the equivalence of the parts adverted to as "reversing clutch-gear", in that he includes an additional element, namely, the pipes leading to either end of the cylinder. Please state whether or not the inclusion of the pipes leading to either end of the cylinder with the elements pointed out by Mr. Henry would alter in an manner your opinion as to the total non-equivalence of the elements mentioned by Mr. Henry as a "reversing clutch-gear" of the Lyndon patent in suit.

Mr. Blakeslee: We object to this testimony construing the form of a question as placing an arbitrary interpretation upon the testimony of the witnesses and amounting to testimony of counsel without his being sworn, and we object to the question further on the ground that it is leading, suggestive, and not the proper method of comparison and proof.

A. The addition of the pipes mentioned to the parts testified to by Mr. Henry as forming what he considers the equivalent elements in the defendant's device of the "reversing clutch-gear" of the Lyndon patent, does not in any way affect the opinion expressed by me previously as to such equivalence.

Q. 231. By Mr. Westall: I now call your attention to the uncertified patent office copy of the specifications and drawings of letters patent No. 533656, granted to N. Lombard, February 5, 1895, and ask you to state whether you have examined and whether you understand the devices therein illustrated and described?

Mr. Blakeslee: Objected to as not coming within the pleadings of this case, no notice thereof being given in the answer filed by the defendant in this suit, and as irrelevant, immaterial and incompetent.

A. I have examined only in a very general manner the drawings of patent No. 533656, and understand in a general way the operation of the parts therein shown.

Q. 232. By Mr. Westall: Will you please explain the objects, operation and effect of the device shown and illustrated in letters patent No. 533656 granted to N. Lombard, dated February 5, 1895.

A. In a general way the device shown in the drawings of patent No. 533656 to N. Lombard, dated February 5, 1895, cover a fly-ball governor moving a balanced valve controlling the admission of pressure fluid to one end of the cylinder or the other, depending on the direction of speed change, and a returning device operated from the movement of the piston rod issuing from the power cylinder thus controlled, consisting of certain mechanical connections to the dashpot mounted on the upper part of the governor, which moves a sliding rack operating a pinion mounted on and forming a part of the stem of the

governor, and which is threaded at its upper portion, and on being revolved by means of the said pinion will lengthen or shorten ^{said} the stem of the governor, and thereby tend to return the balanced valve to its neutral position. The connection shown between the piston rod 10 of the power cylinder consists of an inclined plane having riding on its upper surface a roller which is held to the upper surface of the inclined plane by means of the spring 48. Connected to said roller is one end of a double lever 37 forming a bell crank, by means of which the vertical movement of said roller imparted by the inclined plane through its horizontal movement is imparted to the casing of the dashpot 38. Within the dashpot 38 is a piston mounted on the piston rod 40, connected to the lever 26, which lever 26 at its upper end is connected by the rod 30 to the sliding rack 31 which engages the pinion 34 mounted as before described on the stem 24 of the fly-ball governor. This return device is returned to its central position by means of the mechanism shown at the lefthand side of figure 4, by means of which the lever 26 on being displaced from its central position is forced to return thereto by means of the spring 29, this action taking place whether the lever 26 moves in one direction or the other from its central position. Figure 4 shows also at 42 means for controlling the flow of oil from one side of the piston within the cylinder to the other.

Mr. Westall: Counsel for defendant offers in evidence the patent, specification and drawings referred to, being specifications and drawings of Pat-

ent No. 533656, granted to N. Lombard, February 5, 1895, and asks that the same be received in evidence and marked "Defendant's Exhibit Lombard Patent No. 533656".

Mr. Blakeslee: The offer of this patent or copy as an exhibit is objected to on the grounds registered against the description of the purported patent, namely, that it is not within the pleadings of this case and not a proper defense; and on the further ground that the purported copy is not the best evidence and is not identified, and on the ground that it is irrelevant, immaterial and incompetent.

Q. 233. By Mr. Westall: Please now compare the disclosures of Defendant's Exhibit Lombard Patent No. 533656 with defendant's devices as shown in and illustrated in the various exhibits to which you have referred in giving your previous testimony.

Mr. Blakeslee: Objected to as vague and indefinite. Also on the various grounds urged against the consideration of this purported patent copy.

A. Comparing the device disclosed in Defendant's Exhibit Lombard Patent No. 533656 with defendant's devices shown in the various exhibits in this case, I find that the device shown in said patent covers the defendant's device in every essential particular with the single exception that the automatic feature of the return device as used in defendant's device is not shown in this patent. The fly-ball governor is present in the patent; the governor stem, the balanced valve, the power cylinder, the mechanical connections to one element of

the dashpot, are all found in the said patent; also that direct connection between the second element of the dashpot to a sliding rack operating a pinion mounted on and forming part of the governor stem is also shown in said patent substantially as shown in defendant's device. There are some minor differences in detail, such, for instance, as the connection of the dashpot casing to the water-gate-operating means in the patent, whereas in defendant's exhibit it is the piston of the dashpot which is connected to the water-gate-operating parts. Also in the patent the piston of the dashpot is directly connected to various levers and links to the sliding rack, whereas in defendant's device it is the casing of the dashpot which is so connected. It is a detail which in no wise affects the operation of the mechanism. I find that the parts in the patent corresponding to the rack centering elements in defendant's exhibit, are attached to and form part of the lever 26 of the patent, which device performs exactly the same function as the spring with its clips used in defendant's device. In general, defendant's device is made in accordance with the disclosure of patent No. 533656, granted to N. Lombard, February 5, 1895, with the single exception that the automatic feature of the rate of adjustment now used in defendant's exhibit is not shown in the said patent.

Mr. Blakeslee: In view of the vagueness of the last question, we will ask the defendant if he wishes further to confine the testimony of the last answer

by any limitation thereof to any parts of the alleged infringing structure, or whether we are to understand that the comparison was with the entire infringing structure? This is merely a suggestion, and not an objection.

Mr. Westall: The question is directed merely to a general comparison, pointing out those features which are similar to the corresponding elements of the defendant's device. It is merely to show the development of the art prior to the date of the Lyndon application.

Q. 234. By Mr. Westall: The witness Henry, as you will recall, has pointed out the casing of the returning dashpot, the piston head enclosed therein and the piston rod extending therefrom and the power fluid enclosed therein as forming in their combination the equivalent of the clutch of the returning device of the Lyndon patent in suit. Professor C. L. Cory in his testimony has differed from the witness Henry by pointing out the cam adjusting means indicated by E on Complainant's Exhibit KKKK as the equivalent of the clutch of the returning device, pointing out the piston rod marked G, the bell-crank H, the link I, the lever J and the rod K as part of the means connecting the clutch with the operating shaft. Please state whether or not you consider the new elements referred to by Professor Cory as the equivalent of the clutch-gear of the returning device or the combination of the parts indicated by E with those indicated by the

witness Henry as forming the equivalent of said clutch.

Mr. Blakeslee: Objected to as placing an arbitrary interpretation on the testimony of Complainant's witnesses, not the proper method of comparison or proof, and as leading and suggestive, and calling for a conclusion on the part of the witness.

A. I find no equivalence between the clutch returning device of the Lyndon patent in the combination mentioned by Mr. Henry, namely, the casing of the dashpot, piston therein, piston rod and the power fluid, nor in the device mentioned by Mr. C. L. Cory shown at E on Complainant's Exhibit KKK, nor in any combination of these two collections of parts. I see nothing in this part of the device resembling in any way what is known as a clutch, and can therefore see no equivalence between that and what is evidently known as a clutch. The cam part mentioned by Mr. C. L. Cory is an adjustable means of controlling the rate of flow of the fluid from one side of the piston to the other within the cylinder, which part under certain conditions is recommended by manufacturers of the device to be omitted entirely, in order that the governor may perform its functions even more satisfactorily under those particular conditions.

Mr. Blakeslee: We ask that the last sentence of the last answer be stricken out and withheld from consideration as not responsive to the question, and being a purely volunteer statement and a statement of hearsay and not the best evidence of what the

manufacturers of this apparatus may or may not recommend.

Q. 235. By Mr. Westall: I now place before you Defendant's Exhibit Lamb Patent, Defendant's Exhibit Swiss Patent, Defendant's Exhibit Translation of Swiss Patent, Defendant's Exhibit French Patent and Defendant's Exhibit Translation of French Patent, and ask you to compare generally the operation and effect of the auxiliary valves and nozzles and the by-pass valves and nozzles of those exhibits with the main water-gate and by-pass valve of Lyndon; also include in the comparison the Bakersfield installation by the Power Development Company of 1896 and 1897, the object in question being to have you classify generally, if possible, the results accomplished and the manner of accomplishment in the various devices illustrated in the exhibits I have mentioned.

Mr. Blakeslee: Objected to on each and all of the grounds of the objection urged against the consideration and offer of the various exhibits mentioned in the question, and as being part of the purported defenses in this case.

A. Taking up first Lamb Patent 668801, I find provided mechanism by means of which the flow of water in the main conduit shall be unchanged during governor action, which means that the pressure shall be unchanged at the same time, and that water not required to drive the wheel forward shall be used to check its forward movement; that the change in flow as between these two nozzles shall

be the same, in order to maintain the flow of water in the main conduit unchanged, to the end that governing may be permitted rapidly. This patent contemplates the employment of one or more of these reverse-acting nozzles in order to control a part or the whole load change. The device will never use at any time more water than is demanded by the wheel itself at full load.

Referring to Defendant's Exhibit Swiss Patent and Defendant's Exhibit Translation of Swiss Patent, I find means provided for governing the water-wheel utilizing a by-pass nozzle during closing action of the main water-wheel gate in order to prevent excessive and dangerous pressure rises in the pipe-line, which by-pass nozzle is slowly closed at the conclusion of the movement, thereby preventing the waste of a greater quantity of water than that required to prevent such excessive pressure rises in the pipe-line.

Considering Defendant's Exhibit French Patent and Defendant's Exhibit Translation of French Patent, I find means provided for governing the water-wheel in such manner that there shall be no excessive pressure rises in the main conduit. The means shown for accomplishing this purpose is a relief valve which is made to open on the closing movement of the main water-wheel gates, and thereafter to slowly close, to the end that there shall not be wasted more water than required to prevent the said excessive pressure rises in the pipe-line.

Considering the installation made by the Power

Development Company on Kern River near Bakersfield in the years 1896 and 1897, I find means provided for promptly governing the water-wheel in such manner that there shall be no variation in velocity or pressure in the main pipe-line during governor action; that the by-pass valve shall discharge at all times that quantity of water not required by the wheel to develop the power called for. This device will use at no time more water than is required by the wheel at full load and it will discharge at all times the same quantity of water. The by-pass valve is so constructed and arranged as to operate in a reverse direction to the movement of the main water-gates when these close and when they open.

Referring to the device shown in the Lyndon patent, I find means intended to provide for a constant flow and constant pressure in the main conduit during governor action, a by-pass valve being arranged to discharge when in its normal position that quantity of water which has been selected by the designer to take care of his predetermined greatest load change. Furthermore, that this by-pass valve has the ability to discharge the quantity of water which may be rejected by the wheel under a decreasing load. The accomplishment of this change requires that this by-pass valve shall be in partly open position when in its normal position, and that it shall open when the main gate closes and close when the main gate opens. In this construction the total quantity of water required by

the installation will be that amount called for by the wheel at full load plus that required by the by-pass when in its partly open position. In case the by-pass is made of sufficient capacity to take care of full load changes, the quantity of water going to waste through the by-pass in its normal position will be equal to that called for by the wheel at full load, thereby requiring the provision of twice the amount of water which otherwise would be required.

Q. 236. By Mr. Westall: Please now compare the device of defendant as illustrated in the various exhibits to which you have referred in your previous testimony, as to such results and their accomplishment, with the device referred to by you in your last answer.

Mr. Blakeslee: The same objection.

A. Making a similar comparison of Defendant's device shown in the various exhibits, I find provision of means for governing the water-wheel in such manner that this shall be satisfactorily done without causing excessive and dangerous pressure rises in the main conduit. The means provided for accomplishing this change are the main water-wheel nozzle controlled by a needle valve, an auxiliary relief nozzle controlled by a needle valve, the various parts being constructed and arranged so that the auxiliary relief valve will be opened on a more or less rapid closing action of the valve of the main needle nozzle, especially in that portion of its range nearer its closed position, and at the conclusion of the govern-

ing movement the valve of the automatic relief nozzle will slowly close, thereby preventing the waste of a greater quantity of water than that required to prevent such excessive pressure rises. The device is intended to protect the pipe-line and to permit the greatest possible economy of water in accomplishing such object.

Mr. Westall: You may inquire, Mr. Blakeslee.

CROSS-EXAMINATION

Mr. Blakeslee: Reserving each and singular all the objections heretofore registered in respect to any of the testimony given by this witness and any of the exhibits introduced and discussed and considered in connection with the direct examination of this witness, and particularly with respect to such exhibits offered in connection with the purported defenses, notice of which is not given in the answer; and with respect to exhibits which are not fully identified, and the like, and other objections; and abiding the decision of the Court as to each and all of these objections and not waiving any of such objections, or the rights of complainant thereunder, I will proceed to cross-examine the present witness.

IT IS STIPULATED by counsel that any discrepancies which may occur to particular references to exhibits where such discrepancies are clearly apparent, may be cured by the Examiner in making the transcript of the record, or that after such transcript is made, provided, further, that it is clear

that the witness has understood to what exhibit reference has been made.

Q. 237. Where do you find in Defendant's Exhibit Lamb Patent or in the specifications thereof any warrant for your description of parts 23 and 24, as to the construction and mode of operation thereof?

A. I find such warrant from page 2, line 62, in these general words: "Thus a lift or depression, as the case may be, of the rod 25 operates to move the valve of the driving-nozzle and the valve of the brake-nozzle simultaneously." Further, on page 2, line 41: "The valves are turned by the crank-arms 18, which are secured to the shafts 12 by set-screws 19 or like securing devices, and the crank-arms are connected with oscillating levers 20 by links 21 or other suitable connecting devices." Further, on page 1: "So that as the supply through the driving-nozzle is decreased the supply through the brake-nozzle is increased."

Q. 238. Do you find such numerals 23 and 24 in this patent mentioned in the specifications?

A. In the search just made I do not find those numbers specifically mentioned, but they are used in the drawing and their use is plainly evident and they are ordinary devices which could be used in the form shown, or the rod 25, the action of which is specifically mentioned, could be directly connected to the ends of the oscillating levers 20 20.

Q. 239. When you have been discussing the part

7 of the Lamb patent, have you been referring to the part 7 described in the specification?

A. I was aware at the time of testifying on this point that the figure 7 had been placed on the drawing figure 1, as applying to the nozzle, and that it had been used in figure 2 indicating the buckets on the wheel. Concerning the bucket 7, all my references have been to the nozzle 7.

Q. 240. There is no mention of a nozzle 7 in the specification, is there?

A. I find on page 2, line 27: "One end of the valve 9 opens directly into its nozzle 6 or 8." This nozzle 6 in the specifications is evidently that which is marked 7 in the drawing.

Q. 241. Do these errors in cross-references between the specifications and the drawing interfere with your understanding the mode of operation and construction of the device disclosed in this patent?

A. In the case of such a simple divergence I find no trouble in understanding the construction and operation of the mechanism.

Q. 242. Is it not quite a frequent occurrence for mis-application of reference characters to be made in patent specifications and on the drawings thereof?

A. We find in patent specifications a few such discrepancies, but it is the constant intention on the part of the examiner of the patent office to eliminate these, and, in my personal experience, they have been extremely particular to do so.

Q. 243. You hardly ever take up a patent without finding one or more such errors, do you?

A. My general impression has been that patent specifications are unusually correct in this regard.

Q. 244. In Defendant's Exhibit English Patent, please point out where the pulley P' is shown on the drawing, which you have described as being engaged with the clutch parts 9 and 10.

A. I find on page 2, line 27, "P is a pulley on a suitable shaft which is revolved by any suitable machinery. Upon the same shaft is also the friction pulley P'." Referring to the drawings I find that the said pulley is marked P and that the friction pulley P' is also marked P, the arrangement and use of these parts being such, however, that I would not hesitate to ascribe the proper name to each part shown on the drawing.

Q. 245. That device which includes in its operation one of the pulleys marked P on this patent is the friction clutch?

A. It is a friction pulley, forming part of the clutch.

Q. 246. And that clutch is electromagnetically controlled, is it not?

A. The engagement of this friction clutch results in an endwise movement set in action by an electromagnet.

Q. 247. Is there anything mysterious and vague and shadowy about control-lever 24, for instance, or the returning device clutch 22 23 in the Lyndon patent in suit, which is not similarly nebulous, vague

and shadowy, if at all, with respect to the operation of this clutch through the electromagnets shown in the English patent?

A. I find nothing shadowy or vague in either one of these devices, as far as the connection of the electromagnets is concerned.

Q. 248. The electromagnets disclosed in the Lyndon patent are each and all controlled as to their energization by the movements of strictly mechanical features, are they not?

A. The contacts required to energize the magnets of the Lyndon patent are all of a mechanical nature.

Q. 249. And each energization of each such electromagnets, produces a mechanical movement or mechanical effect, does it not?

A. The energization of these magnets produces through the related part a movement.

Q. 250. And whether the impulse from the prime mover be transmitted to the actuated part by electrical or purely mechanical means, such transmission is through a path of energy, is it not?

A. Transmission of energy, of any nature, is over a path of some sort.

Q. 251. Do you find such a path leading to each of the mechanical features in the Lyndon patent which is immediately actuated through electromagnetic means?

A. The question is rather vague. I will ask you to specify more clearly what you mean, so that I may properly answer.

Q. 252. I will modify by including within the

question all purely mechanical parts disclosed in the Lyndon patent which are actuated immediately by electromagnetic means.

A. If I understand the question properly, I will answer that every transmission of energy requires a path, whether it be mechanical or electrical.

Q. 253. That is a good general statement, but I will ask that the question be answered in addition to such volunteer statement.

A. I will again ask you to make the question definite so that I can understand just exactly what you want.

Q. 254. I will ask that the question be answered, unless you are willing to state that you do not understand the question.

A. I have stated that I did not understand the question thoroughly enough to be satisfied to answer it except in the general terms in which I have already answered it.

Q. 255. The diagramatic showing of circuits and circuit connections in figure 7 of the Lyndon patent in suit is a substantially correct showing of the circuits as described and disclosed in the specifications of the patent in suit, is it not?

A. With certain designated figures which I have already testified to as not agreeing completely with the other parts of the specifications and drawings, I will accept this diagram as showing the intention of Mr. Lyndon in this respect.

Q. 256. If you follow that diagram to determine what the law of operation of the Lyndon patent sub-

ject is, do you encounter any problems of vagueness and obscurity or nebulousity?

A. I find nothing vague in this diagram as to the paths which are intended to be followed by these currents.

Q. 257. And if you consider the currents as following these general paths, are you not able to make out satisfactorily the mode of operation of the subject of the Lyndon patent in suit?

A. I am able to interpret this diagram as acting in a certain manner. It does not, however, show anything more than the paths by which these currents flow,

Q. 258. Well, in your various comparisons of the subject of the Lyndon patent with the numerous exhibits in this case, you have displayed somewhat apparently full and dependable knowledge of the mode of operation of the subject of the Lyndon patent in suit. In so testifying did you not rely upon that diagramatic showing of the electrical paths in figure 7?

A. In studying the Lyndon patent I compared figure 7 with the other figures and used it as a means of understanding the operation. The diagram in itself does not show the method of operation. It does not show the means by which these circuits are completed, when they are completed, nor when they are broken. With this diagram alone there would be no possibility of understanding the operation of the Lyndon patent.

Q. 259. But you used this diagram, did you not,

in figuring out the mode of operation, including the performance of the mechanical features, as well as of the electrical features?

A. I did not so use this diagram. It was used solely for the purpose of more clearly understanding the diagrams shown especially in figure 1.

Q. 260. Then you used it and relied upon it in working out to your satisfaction the mode of operation of the disclosure of figure 1 of the patent? Is that correct?

A. To the extent to which this diagram is correct. I found discrepancies in it which I had to allow for.

Q. 261. Defendant's Exhibit Wetmore Patent is for an electro-mechanical water-wheel governor, is it not?

A. The Wetmore patent has for a title "Electrical water-wheel governor," and shows also mechanical parts in connection with the electrical parts.

Q. 262. In kind, is it not an electro-mechanical water-wheel governor, as is the specific disclosure of the Lyndon patent in suit?

A. In general terms, I would consider it an electro-mechanical governor in the same sense in which I would consider the Lyndon patent in suit.

Q. 263. Is not that also true in respect to Defendant's Exhibit English Patent?

A. The same applies to the English patent.

Q. 264. Defendant's Exhibit French Patent is for a hydro-mechanical water-wheel governor, is it not?

A. I find the French patent, according to the

translation, to be for a "self-regulating by-pass for a water-wheel."

Q. 265. Well, the by-pass shown in this patent is hydro-^{electric}~~mechanically~~ operated, is it not?

A. I would so consider it, the indicating means being moved by the fly-ball governor.

Q. 266. Is not the by-pass or relief valve operated by water in the penstock in one direction?

A. This relief valve is operated by the pressure derived from the water in the penstock.

Q. 267. And directly operated by the pressure of that water, is it not?

A. Quite directly; yes, sir.

Q. 268. There is nothing mechanical that intervenes between the pressure of the water and the relief valve, is there?

A. The pressure acts directly on the mechanical parts which must move to perform the functions of the relief valve.

Q. 269. Then might not the term "hydro-mechanical water-wheel governor" be applied to this French patent disclosure?

A. Not at all. I do not consider this relief valve necessarily part of the governor.

Q. 270. It is not a part of the governor as far as being mechanically connected with the remaining devices, is it?

A. It is decidedly mechanically connected to the other parts of the governor.

Q. 271. Please show me any mechanical connections between it and any part of the governor.

A. The mechanical connection between this relief valve and the governor would be the double lever J J, the rod p, the piston l, the cylinder k, the valve i, the stems c, all of which mechanical parts are necessary for the operation of this relief valve.

Q. 272. And the valve i at times is entirely physically separated from this relief valve, is it not?

A. It is so separated when the necessity for movement in that direction occurs.

Q. 273. And when it is so separated there is no physically laid line of mechanical connection between this relief valve and the remaining portions of the governor, is there?

A. There is no tie in that case except the escape of water, which is the element which controls the amount of such separation.

Q. 274. And really this relief valve is operated in both directions by the water, is it not?

A. It is moved in that direction in which the pressure preponderates.

Q. 275. The water which actuates the relief valve in this French Patent all comes from the penstock, does it not?

A. It does.

Q. 276. And yet you object to the term "hydro-mechanical" as applied to this governor and the operation of the same, including the operation of the relief valve? Is that correct?

A. The objection is solely on the inclusion of this part is a necessary part of the governor.

Q. 277. Assuming that we include this relief

valve as part of the general governors. Is not that term "hydro-mechanical" properly applicable to the entirety

A. That term can be properly applied, there being no other force used.

Q. 278. Now, may not that same term "hydro-mechanical" be applied to the apparatus disclosed in Defendant's Exhibit Swiss Patent?

A. The method of operation in these two patents being the same in general, the thing which is applicable to one is applicable to the other.

Q. 279. In this Swiss patent, as you understand it, the main water-gate or wheel-gate is hydraulically operated to open the penstock, is it not?

A. The movable portion of the main wheel-gate is operated by pressure from the penstock.

Q. 280. No mechanical means are disclosed by opening this wheel-gate, are there?

A. Mechanical means are provided for controlling the rate of opening. Without such mechanical parts the gate would not be operative.

Q. 281. But the pressure of water at the wheel-gate is what actually opens the gate, is it not?

A. It is the preponderance of pressure at that point over that obtaining above the differential piston.

Q. 282. And there is nothing else to impart motion to open the gate, is there?

A. That is the force used to move the gate.

Q. 283. In other words, the wheel-gate, as far as its degree of openness is concerned, in the Swiss

patent, is at the tender mercies of the pressure of water in the penstock, is it not?

A. Not at all. It is controlled by the speed-sensitive element of the governor. I will add to that, if you wish, special provisions being made as shown in figures 4 and 5 for counter-acting varying pressures in the penstock.

Q. 284. But if all pressure is absent from the penstock this gate will close because of the withdrawal of that pressure?

A. In such a case, there being no operating force in either direction, whether it would close or not would depend on the relation of the weight of the parts and the friction. It might or might not close.

Q. 285. There is no mechanical connection between this gate or the by-pass or relief valve in this Swiss patent whereby one is caused to move inversely to the other, mechanically, is there?

A. The main gate and by-pass valve are mechanically connected, strictly, there being a depressible member included which acts in opposition to the pressure in the chamber p.

Q. 286. If the pressure is withdrawn from the penstock at the gate, as by terminating the flow of water therein, the water-wheel gate can fall or lower without moving the by-pass, in this Swiss patent disclosure? Is that not correct?

A. I should say that in such case should the weight of the parts overcome the friction of the joints, that the main gate would close and would open the by-pass valve.

Q. 287. Would not the springs surrounding the part tend to help up the by-pass control and keep the by-pass closed?

A. I think likely that it would, on looking more closely into the construction.

Q. 288. Then it is possible that in the operation of this Swiss patent device that the water-wheel gate might move independently of the relief valve without imparting an impulse to the same, tending to produce inverse motion thereof? Is that not correct?

A. The conditions you have been just describing are not operating conditions. There would be no wheel operation under such conditions.

Q. 289. I am discussing the apparatus as such irrespective of any general condition of operation, and I will ask if the last statement is not correct?

A. I can say in this connection that this device is particularly designed to accomplish that result, even under operating conditions.

Q. 290. And what particularly provides for such possible operation?

A. The device is so arranged that a slow movement of this main water-wheel gate in a closing direction has no effect on the by-pass valve. That is provided for by the leakage through the passages in valve t shown in figure 4.

Q. 291. But assuming the pressure of flowing water at the water-wheel gate withdrawn, there would be a material and extreme movement of the water-gate and relief valve, would there not?

A. The question does not convey any particular

idea to me unless it be that the main water-gate would close and the relief valve would not move at all.

Q. 292. That is exactly what I understand. In the operation of Defendant's Exhibit Lamb Patent the amount of water entering the working zone of the wheel or wheel-case is supposed to be at all times constant?

A. It depends on whether the wheel was designed to take care of full load changes or part load changes. In case it was designed to take care of full load changes, that is the intention. Where it is designed to take care of part load changes there would necessarily be a difference of flow in the penstock at different times.

Q. 293. In the operation of this Lamb patent governor, no water is passed by the wheel in the governing action is there?

A. I would say that the amount of water going through the reverse driving nozzle 8 is passed by the wheel.

Q. 294. How can it have a braking action on the wheel if it is passed by the wheel?

A. The normal travel of this water is in driving direction on the wheel, and it passes by it in the sense that it ceases this driving and performs a reverse function.

Q. 295. And is used on the wheel for a different purpose? Is that not correct?

A. Yes; it is used to check the speed of the wheel at times and to accelerate it at others.

Q. 296. Every bit of the water that enters the wheel case in this Lamb device is directed at and impinges upon the wheel?

A. All the water strikes the wheel either on one side or the other.

Q. 297. And some of it strikes the wheel to retard the wheel and some of it to impel the wheel forwardly, at the same time, during governing action? Is that not correct?

A. That water which has been driving and is not further required is employed to retard, and vice versa.

Q. 298. So that you have water at the same moment impinging upon the wheel tending in part to turn the wheel in one direction and in part in the other?

A. That is correct.

Q. 299. Do you think this is good engineering?

A. I consider that the idea is good, the operation of this reverse nozzle 8 being to prevent those speed changes at the time of governing which have been the main concern of water-wheel governor designers.

Q. 300. Speed changes are what necessitates governing, are they not?

A. Speed changes in those governors which are controlled by speed changes are a necessity. In those governors controlled by load changes they are not necessary, but usually present to a greater or less extent.

Q. 301. When a certain quantity of water strikes the wheel to impel it in one direction and a

certain quantity of water strikes the wheel to retard it or tend to impel it in the other direction, there is an actual waste of energy, is there not, from the standpoint of the potential resultant of the wheel?

A. There is a waste in this case to the extent of the water applied reversely, except as its assistance may be considered of value.

Q. 302. And the waste is twice in quantity, measured in water, what the flow through the brake nozzle amounts to? Is that not correct?

A. I do not think we can consider the waste as being double, inasmuch as the quantity discharged by the reverse nozzles is the only waste that I can see.

Q. 303. Does not the discharge of this water passed through the brake nozzle into the wheel case cause a retarding effect which nullifies the impingement of a substantially like quantity of water upon the wheel through one of the driving nozzles?

A. The water flowing through this reverse nozzle 8 under equally efficient conditions would counter-balance the effect of an equal quantity of water applied to drive the wheel.

Q. 304. So if we assume the valve 9 of the nozzle marked 7 to be half-way open, and the valve 9 of the nozzle marked 8 to be half-way open in the construction and provision of parts and nozzles shown in figure 1 of the Lamb patent, approximately one-fifth of the water in the wheel casing and applied to the wheel would be wasted. Is not that correct?

A. With the number of nozzles shown in the drawing such would be the case.

Q. 305. And if the valve 9 of the nozzle marked 7 were entirely closed, and the valve 9 of the nozzles marked 8 were entirely open, two-fifths of the water passing into the wheel casing would be wasted. Is that not correct?

A. Under the assumptions made, the statement is correct.

Q. 306. Did you ever see constructed a water-wheel and governor corresponding substantially to the disclosures of the Lamb patent?

A. The general idea underlying the Lamb patent is old in mining work and hoists wherein two wheels are used on the same shaft, or at times a single wheel with reverse buckets has been used to obtain this same effect.

Q. 307. And with water at the same time impinging upon the wheel to impel it in opposite directions?

A. That is the case. There were two sets of nozzles provided, and one set directed to drive the wheel in one direction and one in the opposite direction, which nozzles were under the control of the operator and were used by him to control the speeds of this wheel for hoisting purposes.

Q. 308. Were those nozzles arranged substantially in opposition to each other so that the stream lines from the nozzles would be substantially co-extensive?

A. Substantially so in some cases.

Q. 309. Can you define what the condition of the water would be directly beneath the wheel shown in figure 1 of the Lamb patent with the valve 9 of the nozzle 7 and the valve 9 of the nozzle 8 each half-way open?

A. The result cannot be predicted, inasmuch as there is no definite bucket construction shown.

Q. 310. There would be considerable turbulence of water current where the jets of the two nozzles comingle?

A. There would be in a wheel of the small size shown here, but not necessarily so in a wheel sufficiently large to permit action of such reverse streams.

Q. 311. Would that turbulence of water affect accurate governing, in your opinion?

A. Just to what extent that turbulence would affect governing, I am unable to state. It would depend upon the suddenness of the change in conditions with reference to the other parts of the mechanism.

Q. 312. The water rejected by the wheel and passed through the by-pass in Complainant's Exhibit Lyndon patent and in the apparatus disclosed in Complainant's Exhibits E to L, in no way interferes with the projection of the water directed to the wheel through the water-gate, does it?

A. It does not.

Q. 313. Such water is in a true sense passed by the wheel and does not impinge upon it at all? Is that not correct?

A. Such water does not touch the wheel in any sense.

Q. 314. And in that sense the auxiliary relief valve is part of an actual by-pass, is it not?

A. It is a by-pass when in operation, as also is that shown in the Lyndon patent.

Q. 315. And is always such a by-pass in operation?

A. It is not the by-pass in operation except when it is discharging water.

Q. 316. And then at all such times it is a by-pass, is it not?

A. These devices are by-passes only when discharging water in an operative sense.

Q. 317. The specification of the Lamb patent refers to the nozzle 8 as a brake nozzle. Don't you think that is a better term for that nozzle than the term by-pass?

A. When we consider a device we must consider its nature and not the name given it by a man whomay not be well posted on the subject.

Q. 318. The brake nozzle 8 of the Lamb patent does not pass any water by the wheel without such water impinging upon the wheel, does it?

A. Water passing through nozzle 8 in the Lamb patent passes by the wheel in the sense that it ceases to drive that wheel, and does not pass by in the sense in which it totally escapes the wheel.

Q. 319. But every bit of it that strikes the wheel affects the rotation of the wheel?

A. All the water striking the wheel must affect it.

Q. 320. And every bit of it must strike the wheel, according to the location of the particular nozzle?

A. All of the water is intended to strike the wheel either in one direction or the other, driving or retarding.

Q. 321. Then do you consider the main wheel-gate of the Lyndon patent a by-pass because when the water passing through the same has acted upon the wheel it flows away from the wheel?

A. I would not consider the main gate of the wheel in the Lyndon patent a by-pass valve.

Q. 322. Why is the brake nozzle 8 of the Lamb patent any more part of a by-pass than the driving nozzle No. 7?

A. For the simple reason that the water flowing through nozzle 8 in the Lamb patent is not used to drive the wheel in a forward direction.

Q. 323. And how do you translate that condition in view of the fact that it actually does affect the rotation of the wheel into such a condition as would support the use of the term "by-pass"?

A. For the simple reason that the water passing through nozzle 8 is not used to drive the wheel in a forward direction. It is used incidentally to retard the wheel to assist in the governing action.

Q. 324. And the effect of all the water passed to the wheel of the Lamb patent device through any nozzle therein shown has a plus or minus effect with

respect to the rotation of the wheel in a given direction. Is that not correct?

A. That is a very neat way of stating it.

Q. 325. And every bit of the water traversing the penstock or supply pipe leading to the Lamb water-wheel device has a plus or minus effect upon the rotation of the wheel, has it not?

A. It has such an effect, plus or minus.

Q. 326. And that is not true of all the water traversing the penstock leading to the apparatus of the Lyndon device or to the apparatus disclosed in Complainant's Exhibits E to L, is it? Eliminating, of course, pipe leakages under both conditions.

A. Carrying out the comparison, I should say that the condition found in the Lyndon device would be a plus and a zero effect.

Q. 327. And how about the installation reflected in Complainant's Exhibits E to L?

A. With reference to the defendant's device, I would say that it was a plus and at times a zero effect.

Q. 328. Did you ever know the term "by-pass" to be applied to any branched conduit which directed fluid for use upon the same impelled or driven part as impelled or driven by the fluid traversing the main conduit?

A. In the hoist water-wheels before described as being used in a somewhat similar manner to that shown in the Lamb patent. I do not remember that there was any name attached to the parts involved.

Q. 329. Isn't the essential object of a by-pass as

generally understood to pass fluid around a certain working zone or piece of apparatus?

A. Considering the common form of by-pass as that which is applied to the main gate and pipe-line its declared purpose is to pass water from the upper side of its valve and to exert pressure on the lower side of said valve in order that the valve may be more easily opened.

Q. 330. Do you consider that a by-pass arrangement?

A. That is commonly called by that name. It is a by-pass as that word is commonly used.

Q. 331. Is not that merely a fork or branch of the pipe-line?

A. The name universally attached to this device is a by-pass.

Q. 332. Well, in order that we may determine what your understanding of a by-pass is, generally, I will ask you to give a definition of it in its broad aspects.

A. I would define a by-pass as being a device intended to divert the flow of water from the main conduit through a branching conduit. The disposition of the water after it passes through this branch is immaterial in this definition.

Q. 333., And the use of this water after it has entered the branch is immaterial with respect to your definition, is it?

A. The disposition of the water after it had passed through this by-pass valve is immaterial.

Q. 334. How about the utilization of it? Is that immaterial?

A. I consider the utilization as immaterial in this definition.

Q. 335. Then you draw no distinction, do you, between a branch conduit which leads fluid completely around and away from a given operative feature and a branch conduit which leads fluid to a point of application to the working device other than that to which the fluid is directed by the main conduit. Is that correct?

A. As in all other words used in mechanics, the word "by-pass" is applied to devices varying in nature, and to have an accurate understanding of the devices it is necessary to consider the nature more than the name. The name can be applied to either of these conditions mentioned.

Q. 336. I assume that each of the water-gates shown in Defendant's Exhibit Berry Blueprint No. 1 is supplied from the main supply pipe or penstock. Is that not correct?

A. All of these valves are supplied from the same main penstock.

Q. 337. And each valve controls a separate nozzle in effect, does it not?

A. That is true.

Q. 338. Do you consider these various nozzles by-passes of the main supply pipe?

A. Referring to the valves on the wheel, I do not consider them by-passes.

Q. 339. Do you consider the openings which the valves respectively control as by-passes?

A. I do not consider that there is any by-pass in this part of the mechanism, they being main water-wheel gates.

Q. 340. Well, suppose there are no by-passes purported to be shown in this blueprint. Could you then consider these several nozzles by-passes?

A. I would not consider them by-passes.

Q. 341. Why wouldn't you consider them by-passes?

A. I would not consider them by-passes because their purpose is not to by-pass the wheel in any sense, but to supply water to the wheel.

Q. 342. And that is perfectly true of the nozzle marked 7 and nozzle marked 8 in figure 1 of the Lamb patent?

A. There is a very material distinction, in that all of these nozzles shown in Defendant's Exhibit Perry Blueprint No. 1, that they are used to drive the wheel in one direction and in the other, because one is used to drive and the other to retard.

Q. 343. But in both cases the water coming from all of these nozzles is used to affect rotation of the wheels?

A. That is correct.

Q. 344. And the fact that there is a difference in the effect of impingement between these two nozzles, you consider, do you, to be warrant for your calling the nozzle of one side a by-pass and the nozzle

of the other side not a by-pass? Is that your distinction?

A. Therein rests the distinction between the by-pass and the main driving nozzles.

May 6, 1914—A.M. *52 Berry recalled cross examination resumed by Mr. Babcock*

Q. 345. Referring to Defendant's Exhibit Berry Blueprint No. 1 and to Defendant's Exhibit Lamb patent, you find in each of the structures shown therein a plurality of water-gates or nozzles for directing the water at a water-wheel, do you not?

A. That is the case.

Q. 346. The water-gates or valve-controlled nozzles in each of these instances are, in each instance, mechanically coupled together, are they not?

A. The nozzles in the Lamb patent are not valve-controlled except in one case, as shown in the drawing.

Q. 347. Those two nozzles which have working valves are mechanically connected as to the other valves in the Lamb patent, are they not?

A. The two nozzles in the Lamb patent having valves are mechanically connected.

Q. 348. Now, am I to understand that neither of the valves or valve-controlled nozzles shown in Berry Blueprint No. 1 is a by-pass with relation to any or all the other nozzles shown in Berry Blueprint No. 1, and, at the same time, am I to understand that one of the valve-controlled nozzles shown in the Lamb patent is a valve by-pass with respect to the other valve-controlled nozzle shown in the Lamb patent?

A. If you are referring to the main-water-gate-valve of Defendant's Exhibit Berry Blueprint No. 1——

Q. 349. In both cases I am referring to the nozzles having valve control and which direct water against the wheel.

A. None of the valves controlling the nozzles applying water to the wheels in Defendant's Exhibit Berry Blueprint No. 1 is a by-pass valve, whereas in the Lamb patent the reverse-acting nozzle is a by-passed nozzle, inasmuch as it has reversed the normal driving action of the water and has diverted the flow of energy to the wheel in a driving direction, and has applied it in a reverse direction.

Q. 350. You referred to the auxiliary valve in discussing Complainant's Exhibits E to L as a "relief-valve". Is it not more truly, even within your definition of the by-pass, a by-pass than the nozzle 8 with its valve 9 shown in the Lamb patent?

A. The auxiliary relief-nozzle in defendant's device is a by-pass valve when in operation, specifically provided to relieve excessive pressure in the pipeline or to prevent such excessive pressure in the pipeline. It is no more a by-pass than the nozzle 8 in the Lamb patent, for the reason that the nozzle 8 in the Lamb patent is a means for diverting the flow of energy previously applied to driving the wheel and applying it in a reverse direction.

Q. 351. Any such water as passes or may pass beneath the wheel of the Lamb patent structure from the nozzle 8 and be co-mingled with water directed

upon the wheel from such nozzle marked 7, will strike the wheel in a direction tending to impel the wheel positively or forwardly, will it not?

A. Whether there will be comingling of the water from the nozzle 8 in the Lamb patent with that discharged from nozzle 7, will depend on the design of the wheel. Should there be such comingling, the water from nozzle 8 cannot drive the wheel forward, its application being reverse, and must therefore tend to retard the wheel.

Q. 252. I am asking you whether or not such water from the nozzle 8 comingled with the water from the nozzle 7 would not be applied to the wheel with such water from nozzle 7 in an impelling action, tending to rotate the wheel positively or forwardly.

A. There could be no such action due to the energy of water discharged from nozzle 8. In case of severe mingling of water discharged therefrom with that discharged from nozzle 7, it is possible that some of the water from nozzle 8 might be reversed in its flow by the water from the nozzle 7, but it would have no driving energy of its own and could not, therefore, impel the wheel in a forward direction.

Q. 353. Might not the water from both such nozzles upon comingling be whirled in an eddy formation so that the resultant line of force when the comingled water struck the wheel would be in a direction tending to forwardly and positively rotate the wheel?

A. In the case of a design so poorly executed

that such a severe comingling takes place, the resultant would, in the case of a preponderance of energy from nozzle 7, be in the direction of impelling the wheel. In case of a preponderance of energy from the nozzle 8, it would be in a direction reversing the movement of the wheel. Which prevails would depend upon the preponderance of the two forces. In no case, however, will the energy from nozzle 8 drive the wheel forward, its effect being to decrease the effect of the energy in the flowing water from nozzle 7.

Q. 354. Nevertheless, such possible results might be built up, might they not, so that energy of water from both such nozzles might be imparted to the wheel for its forward positive propulsion?

A. There can be no condition under which energy of the water from the nozzle 8 could drive the wheel forward.

Q. 355. In other words, there can be no condition which will produce such resultant in which the comingling^{ed} waters of the two nozzles will act in an eddy current to forwardly propel the wheel?

A. Such a resultant forms, as I understand it, the prime object of this design, the intention being to have this resultant work in one direction or the other, depending on the conditions. At the same time, there can never be any energy from the water of nozzle 8 used to propel the wheel forward, its action being directly opposite. And there is no way shown by which this energy can be reversed and applied to drive the wheel forward.

Q. 356. Suppose the flow from both valves 9 is equal, so that the mutual impacting jets show no preponderance in one nozzle direction or the other. What will be the direction of application of the energy of the resultant condition?

A. Under such conditions there would be no resultant, opposite equal forces balancing each other.

Q. 357. In which way would the water of such balancing mingled jets flow?

A. Considering such jets so placed, without the disturbing influence of the buckets, the flow would be likely to be sideways.

Q. 358. What would confine it to such sidewise movement and prevent its general eddy movement?

A. The side movement would be more or less shown in its nature, and that element tending to produce side motion would be the equal quantity and velocity of the water.

Q. 359. But there is nothing present in the drawing of this patent to prevent upward bulging and cross bulging of such co-mingled water mass is there?

A. There is nothing shown to direct the water of these streams after they have come out on the wheel.

Q. 360. And nothing but the wheel to confine the flow of such comingled currents is there, plus the nozzle structures prior to the water engagement of the wheel?

A. There is no element shown other than the nozzles to direct these streams and the wheel structure is admittedly shown in an incomplete form, so that

it would be extremely difficult to say just what direction these streams would take after striking the wheel. In the case of a wheel properly designed to meet these conditions, there would be no comingling of water while on the wheel. This patent does not show any particular bucket construction or design.

Q. 361. We are discussing now the disclosure of this patent and I am calling attention in these questions particularly to the showing in figure 1 of the drawing. Now, if such comingling of the water from the nozzles marked 7 and 8 were produced, and such resultant eddy conditions set up, would not the energp of such eddy current be in part directly imparted to the wheel?

A. The energy of these streams is not found in the eddies but in the direct application, and there is no possibility by which the energy from the water flowing in nozzle 8 can be so twisted as to drive the wheel forward.

Q. 362. I will ask again that the question be answered as put, and I will call your attention to the fact that I am supposing certain conditions, those conditions involving the setting up of an eddy by the mutual impact of opposed streams from the nozzles marked 7 and 8, beneath the wheel. and I will ask you now and further to state whether or not some of the energy of such eddy currents would not be imparted to the wheel.

A. The resultant energy of the energies found in the two streams would be applied to the wheel, the direction of each being determined by the pre-

ponderance of those energies. The production of energy in an eddy is of such an uncertain nature that it is difficult to answer the question more accurately.

Q. 363. In other words, it is of such an uncertain nature that you would not wish to plot the stream lines which could or might be proper to indicate the current conditions upon the production of such eddy. Is not that correct?

A. I think that an exact delineation of such eddy would be impossible, the resultant in a case of this sort being due to the balance between the forces which would have to be determined by experiment.

Q. 364. In neither the Lyndon patent in suit nor the mechanism of the apparatus disclosed in Complainant's Exhibits E to L is the by-pass valve directly actuated by pressure of water in the penstock? Is that correct?

A. In the Lyndon patent the by-pass valve is not acted on by the pressure of water in the main conduit, but is moved by mechanical means. In the Defendant's device shown in the references mentioned the automatic relief valve is moved by mechanical means and not by the pressure in the main conduit.

Q. 365. And in both cases such mechanical means involve the action of a speed-sensitive device, does it not, such speed-sensitive device being operated by the rotation of the water-wheel?

A. The action in both cases is controlled through speed-sensitive devices responsive to the action of the wheel.

Q. 366. And it is likewise true, is it not, that in

neither the apparatus of the Lyndon patent in suit nor in the apparatus disclosed in Complainant's Exhibits E to L, the water-gate or water-wheel gate or gates is directly actuated or moved in either direction by direct application of pressure of water in the penstock?

A. In both cases mentioned the movement of the water-gate is produced by mechanical means, and does not depend directly upon pressure in the penstock.

Q. 367. Now, in both the Swiss and French patents^{being} being defendant's exhibits, and in either of the same and each of the same, certain movements of the by-pass valve, or of the water-wheel gate or gates, or both, are produced directly responsive to pressure of water in or directly leading from the penstock and directly applied to such part?

A. In the case of the Swiss patent, energy derived from the pressure in the penstock is directly applied to the movements of the main gates under control of the governor, not being responsive to that pressure but to governor changes. The same remark applies to the device shown in the French patent.

Q. 368. However, in each of these French patents and Swiss patents water-pressure applied directly, whether under control or not under control of any other part of the apparatus, produces motion of the by-pass or water-wheel gate or gates, or both, does it not?

A. There is such a direct application of pressure in the conduit to the movements of these devices.

Q. 369. Now, in complainant's Exhibits E to L, and the other Complainant's exhibits which you have discussed in which a dashpot is shown in the train of mechanism for actuating the by-pass valve or needle, the by-pass is actuated purely mechanically, is it not, and I am now referring to the actuation of the by-pass as a unitary element?

A. The relief-valve shown in the exhibits mentioned is actuated by mechanical means.

Q. 370. The operation of the valves in the reversible hoist you testified about yesterday afternoon, for the purpose of applying to the wheel or wheels water to reverse the same or retard the same in motion, was or were manually operated. Isn't that the case?

A. I believe as a rule they were manually operated and probably separately, in most cases. There are conditions, however, in which a single operation would handle both.

Q. 371. You mean that you can conceive of such conditions?

A. Yes, sir.

Q. 372. You never saw such conception put into practice?

A. I do not recall now having seen it, but it would not be a great departure from separate control.

Mr. Blakeslee: We ask that the last portion of the answer be stricken out as purely voluntary and not responsive, and not necessary to answer the question, namely, the part commencing with the word "but it would not be."

Mr. Westall: It seems to me that the answer is directly responsive to the question. The witness has a right to explain his answer so that the state of his mind may appear, and that there may be no danger of having the answer distorted.

Mr. Blakeslee: There is no possibility of explaining into existence a thing which the witness admits is not in existence.

Q. 373. Referring now to Complainant's Exhibits E to L, inclusive, and to the other Complainant's Exhibits which you have referred to in testifying in connection therewith, the dashpot through which and through the agency of which the by-pass nozzle valve or needle is actuated, operates purely mechanically does it not, with the possible qualification that a power fluid is contained therein, and, in accordance with its regulated flow, controls the application and effect of impulses mechanically imparted to such dashpot?

A. The dashpot shown in connection with the auxiliary relief-nozzle in the exhibits mentioned is purely mechanical in its action, with the exception noted as to the content of oil.

Q. 374. Referring again now to Defendant's Exhibit Lamb Patent, in so far as you can make out, in view of the omission in the specifications to define the location and inter-connection of the bar 24 and connecting rods 23, please state what your conclusion is as to the support and mounting of the bar or lever 24.

A. Regarding the specifications as to the movement of the rod 25 responsive to the action on the part of the

governor mentioned but not shown in the drawings, and the movement of the double levers 20 20, it is clear that as shown in figure 4 of the drawing the links 23 23 are connected to the ends of the double levers 20 20 and to the ends of the cross-bar 24 24.

Q. 375. Is the bar 24 centered at any point other than at its point of connection with the rod 25?

A. Bar 24 has no connection except in its connection with the rod 25 and link 23 23.

Q. 376. It is in effect a floating lever, is it not?

A. It has no such construction or effect. It is not a lever in any sense.

Q. 377. Do I understand you to likewise mean that it cannot act as a lever in any sense?

A. It cannot act as a lever except in case the movement on one side or the other is restrained.

Q. 378. If one of the valves 9 should become jammed or stuck and governor action were imparted to the bar 24, one end of that rod, assuming that the other valve 9 was free to turn, would execute a different movement from that executed by the other end of the rod 24. Is that not correct?

A. Assuming that one is prevented from turning, the bar 24 would alter its functions.

Q. 379. Would not one end execute a movement different from that executed by the other?

A. There would be a difference in such movement.

Q. 380. And one end, namely, that end connected with the link 23, connected with the lever 20, connected with the jammed valve, would act as a fulcrum for the resultant movement of the bar 24, would it not?

A. There would be a fulcrum so provided under those conditions.

Q. 381. And then, there being such a fulcrum, the bar 24 would act as a lever, would it not?

A. Under these conditions it would be a lever.

Q. 382. And you would get magnified action of the free valve 9 through the governing action imparted to the train of connections between the rod 25 and such free valve and through the bar 24, now acting as a lever?

A. There would be a magnified movement of that nature.

Q. 383. And in that case the wheel would over or under run, would it not?

A. Under such abnormal conditions the functions designed would not be performed, and there would be disturbances in the balance.

Q. 384. And the construction and inter-relation of the parts indicated in figure 4 of the Lamb patent drawings is such that such independent operation of one of the valves 9 could occur upon the sticking or jamming of the other valve 9, is that not correct?

A. Assuming the construction of a wheel strictly in accordance with figure 4, there would be such possibility.

Q. 385. You had experience with valves sticking in the attempted operation of the Power Development Company's plant near Bakersfield, about which you have testified, did you not?

A. We found the valve as installed somewhat difficult to move on account of the gritty water which was found there.

Q. 386. As a matter of fact, you had to disconnect

that valve, which you have referred to as a by-pass, from the rest of the mechanism to remedy this trouble several times.

A. We did not disconnect it except in so far as it was necessary to drill the opposite end and furnish a pin to hold up the valve.

Q. 387. But you had to disconnect it, did you not?

A. The entire unit was out of use at that time.

Q. 388. Then it is not hard for you to conceive of the possibility of such valve jamming or sticking in the attempted operation of a device such as that depicted in the drawings of defendant's Exhibit Lamb Patent, is it?

A. Such a valve is likely to stick.

Q. 389. And should it stick you would get a magnified inertia effect on the pipe-line, would you not, due to subtraction of the counterbalancing effect of the jet from the valve thrown out of commission?

A. The inertia effect would in that case be the same as that of any other wheel provided with a contractable nozzle. I cannot say that its effect would be magnified beyond that which would be produced by adding or cutting off a certain quantity of water.

Q. 390. But due to the magnified movement of the valve in the nozzle marked 7, which you have admitted, would occur, assuming that the valve in the nozzle marked 8 were jammed, there would be a magnified increase of such inertia effect, would there not?

A. Not necessarily. If this magnified movement produced a greater effect than the load it demanded, the governor would not move so far.

Q. 391. I am presupposing a given and definite speed change. I will ask that you answer the last question under those conditions.

A. Assuming that a given speed change produces a given movement in the rod 25, there would be a disturbing effect in the main line. Just to what extent it is impossible to say, without knowing more of the detailed construction of the governor.

Q. 392. And that disturbing effect would be greater, would it not, under the conditions assumed, namely, that of definite change in the speed of the wheel and a jamming of the valve in nozzle 8?

A. There is nothing in the question to compare that "greater" with.

Q. 393. And that disturbing effect would be relatively magnified, would it not, under conditions assumed, namely, that of definite change in the speed of the wheel and a jamming of the valve in nozzle 8? Put it that way.

A. The question is very difficult to answer, but I would say there would be a disturbance greater than there would be without such magnified motion.

Q. 394. As a matter of actual practice, it would be practically impossible to equivalently or equally effectively pack both of the valves 9, would it not?

A. Both these valves 9 could be effectively and equally packed as to leakage.

Q. 395. Well, could they be equally effectively packed with reference to resultant frictional retardation?

A. There being no way to measure friction retard-

ation in the mechanism, it would be difficult to show just when they were balanced in this respect.

Q. 396. The variation in packing in such respects would produce a disturbance of governing balance intended to be maintained through the connections 25, 24, 23 and 20, would it not?

A. I would expect to find such disturbance with an unbalancing of the friction in the packing glands.

Q. 397. And even if such packings were equally adjusted, if that were possible, a material period of operation would tend to cause a variance between the packing as to frictional effects. Is that not correct?

A. This frictional effect is likely to change during use; just as likely to be an unequal change as equal.

Q. 398. Then you have a valve-disturbance-sensitive train of governing mechanism in this Lamb patent structure, have you not?

A. A device constructed strictly according to figure 4 would be sensitive to disturb conditions in the valves.

Q. 399. And in ratio to the effect of such valve disturbances, you would have produced inertia effects in the pipe-line due to inaccurate or stumbling governing, would you not?

A. In accordance with the disturbance to the relation of the valves, I would expect to find inertia effects in the pipe-line.

Q. 400. Now, in the Lyndon patent in suit, both the by-pass valve-operating mechanism and the water-gate-operating mechanism being jointly operated by the shaft 20, there is a positive definite relation between the water-gate and the by-pass valve whereby an im-

pulse imparted to one of same must be accompanied by an impulse imparted to the other of same in governing action and unfailingly?

A. These parts not being directly and rigidly connected, that condition would not be obtained unless that part connecting them would be effective. Whether that result is obtained or not depends on the integrity of a number of elements and connections controlling the connections between shaft 20 and the by-pass valve operating mechanism.

Q. 401. When the by-pass operating means is clutched to shaft 20 in the Lyndon patent there is a train of positively acting driving connections between such shaft 20 and a stem 49 of the by-pass valve 48? Is that not correct?

A. Under the conditions assumed, the connection is direct and positive.

Q. 402. And the resultant movements change independent of any inequalities or irregularities in the packing arrangements or provisions, such as are ordinarily and properly provided? Is that not correct?

A. Assuming sufficient strength of parts, that is correct.

Q. 403. And you know as an engineer you would not install such parts without providing sufficient strength to them, would you.

A. I would not.

Q. 404. Now, in Complainant's Exhibits E to L, there is likewise a positive inter-connection between the water-gate-operating means and the by-pass operating means whereby an impulse imparted to the water-gate

must be accompanied by the imparting of an impulse to the by-pass operating means. Is that not correct?

A. There is no such positive connection producing that result.

Q. 405. Do you mean to testify that there is no positive mechanical connection between the stem of the water-gate needle valve and the dashpot mechanism by-pass needle valve in the structure disclosed in Complainant's Exhibits E to L, and the auxiliary illustration exhibits of Complainant?

A. They are not a positive and mechanical connection between the valve of the main needle nozzle, and are part of the dashpot connected with the auxiliary relief valve in the exhibits mentioned.

Q. 406. Then my statements as to the impulse conditions with respect to these parts were correct, were they not?

A. Correct only so far as it involves that part which I have just mentioned as being positively connected, and is not correct as affecting the reciprocal movement between the valve of the auxiliary relief nozzle and the valve of the main needle nozzle.

Q. 407. My question was directed at positive inter-connection between the water-gate-operating means and the by-pass operating means, considering those means generally and including the several parts of each. There is such positive inter-connection whereby an impulse imparted through the governor to the water-gate-operating means is accompanied by the imparting of an impulse to the by-pass operating means? That is correct, is it not?

A. There is no such positive connection, inasmuch as the movement of the valve of the auxiliary relief nozzle responds only under certain conditions of movement of the valve of the main needle nozzle.

Q. 408. Whether it responds or not, an impulse is imparted to it, responsive to which impulse it may respond during governing action. Is that not correct?

A. There is no impulse imparted to it under certain moving conditions of the main needle nozzle.

Q. 409. Every time that the main needle nozzle moves must not the lever, which connects the same with the dashpot mechanism of the by-pass needle nozzle, move?

A. The lever connecting the valve of the main needle nozzle with the piston of the dashpot of the auxiliary relief nozzle must move whenever the valve of the main needle nozzle moves.

Q. 410. And, therefore, whenever such lever moves an impulse is imparted to the dashpot, is it not, and by "impulse" I mean a force having potential which may be utilized through the dashpot in actuation of the by-pass nozzle needle?

A. Whenever the lever connecting the said parts moves, the piston within the dashpot moves, and if this movement be resisted there would be resulting movement on the part of the dashpot. But the device is such that this occurs only under certain conditions. Under certain other conditions there is no impulse imparted which produces any result.

Q. 411. When in governing action the needle of the by-pass nozzle is free, or positioned to move responsive

to such impulse, it will so move inversely to the movement of the water-gate-nozzle needle, will it not?

A. When any movement is imparted to the valve of the auxiliary relief-nozzle, as a result of the movement of the valve of the main needle nozzle, this movement will be inverse in direction to that of the valve of the main needle nozzle.

Q. 412. I do not think that answers the question. Please read the question. (The Examiner reads the question.)

A. You can cut out that answer and I will change it. When the valve of the auxiliary relief-nozzle moves responsive to governor action, it will move inversely in direction to the valve of the main needle nozzle, the energy required to make this movement being supplied by the lever connecting the two parts.

Q. 413. I will ask that the question be again re-read to the witness, and ask him to answer it.

Mr. Westall: It is submitted that the answer is responsive to the question, and if counsel expects any other answer he should put a question which is understood and which is definite enough to inform the witness what is in the mind of counsel.

Mr. Blakeslee: The witness has not stated that he does not understand the question, and if counsel does not, it is unfortunate that he is not testifying.

(The question is re-read by the Examiner.)

Mr. Westall: The witness is instructed that he need not answer the question more fully than he has already done, and it is insisted that the answer may stand of record as given. If the witness wishes to qualify or add

in any way to the answer given, he may do so; and, if not, let another question be asked.

Mr. Blakeslee: The effect of counsel instructing his witness will be construed by the Court. The question is perfectly clear, and we will now ask for a yes or no answer to it.

A. I have answered the question as clearly as I can. In my understanding of it, I cannot conceive of any way in which I can correctly answer yes or no.

Q. 414. By Mr. Blakeslee: Whenever the by-pass valve of Complainant's Exhibits E to L, and the other Complainant's Exhibit related thereto, is in position to move responsive to an impulse imparted to it through the connections from such by-pass needle to the needle of the water-wheel gate, such movement of the by-pass needle will unfailingly take place, will it not? And I will ask for a yes or no answer to this question.

A. I cannot answer this question yes or no, on account of the involved nature of the mechanism.

Q. 415. You understand the operation of this mechanism as testified to in your direct examination, do you not?

A. I understand the operation of the mechanism.

Q. 416. Do you understand it as fully as you understand the operation of Defendant's Exhibit Lamb Patent?

A. I do.

Q. 417. Do you understand the operation as fully as you understand the operation of Defendant's Exhibit Swiss Patent and Defendant's Exhibit French Patent?

A. I do.

Q. 418. Do you understand the operation as clearly and fully as you understand the operation of Defendant's Exhibit English Patent and Defendant's Exhibit Wetmore Patent and Defendant's Exhibit Lamb Patent?

A. I do.

Q. 419. And yet, as to this crucial and essential phase of the operation of the apparatus disclosed in these exhibits relative to the alleged infringing structures, you hesitate to directly answer a question which you have not stated is uncertain or indefinite. Is that correct?

Mr. Westall: Counsel for defendant calls attention to the fact that the witness has stated that the question was vague and indefinite, and that he has explained that he cannot answer the question because he could not understand what counsel meant, and on account of the involved nature of the question and the apparatus therein referred to. Now, if counsel wishes an answer, let him frame a question which can be understood.

Mr. Blakeslee: Now, let us again have the answer of the witness to see how it compares with counsel's statement, and we ask that the answer be read.

(The Examiner thereupon reads the answer to question No. 414. After which the last question, (No. 419, is read by the Examiner.)

A. I am perfectly willing to answer directly any question involving the operation of this mechanism, but I do not see how it can be done by either yes or no, without danger of having the answer misinterpreted.

May 6, 1914, P. M.

52 Henry recalled cross examination resumed by Mr. Blakeslee

Q. 420. In Defendant's Exhibit Lamb Patent there

is no provision made for the return of the valve 9 in the nozzle 8 to a predetermined normal position after any joint movement of both nozzles of the valves has occurred, is there?

A. Such provision is found in the speed-sensitive part of the governor, which on return to normal position returns these valves.

Q. 421. And is that after joint movement of these two valves?

A. After joint movement of these two valves.

Q. 422. After all such joint movement has ceased?

A. After any and all such joint movements.

Q. 423. In other words, the valve 9 in the nozzle 8 returns to such predetermined normal position always by movement independent of movement of the valve 9 in the nozzle 7. Is that so?

A. As far as I understand the question, the two valves return at the same time to a normal position, ready for the next action.

Q. 424. And they return to such position or positions, or are intended to return to such position or positions, by simultaneous movement, are they not?

A. They move together at all times.

Q. 425. Then if they move together at all times, how can the valve in the nozzle 8 return to normal position after the joint movement of such two valves?

A. Both valves partake of any movement produced.

Q. 426. Then you were not correct, were you, when you stated that valve 9 in nozzle 8 is intended to return to predetermined normal position after joint movement of both valves has ceased?

A. I was perfectly correct in that statement.

Q. 427. Then the valve 9 in nozzle 8 returns to predetermined normal position, or is intended to return to predetermined normal position, by a movement which at the same time takes place after joint movement has occurred, and takes place during such movement. Is that correct?

A. These movements are simultaneous in the operation of this device.

Q. 428. And the valve 9 in the nozzle 8 is not intended to return to its normal position without the valve 9 in the nozzle 7 also moving to another position?

A. They are intended to move together at all times.

Q. 429. And in the Lyndon patent in suit provision is made for returning the by-pass valve 48 to normal position after joint movement of the by-pass valve and of the water-gate valves has terminated. Is that not correct?

A. That is correct.

Q. 430. Do you disagree with the specifications of the Lamb patent in its designation of the nozzle 8 as a brake nozzle?

A. Not at all. It may be so called, if desired. The name does not affect its functions in any way.

Q. 431. In the device of the Lamb patent there are no means provided, are there, for a distinct purpose of returning the valve of the nozzle 8 to a predetermined position after joint movement of both nozzles marked 7 and 8?

A. There is no provision for independent movement of the valve 9 of nozzle 8.

Q. 432. There is no means provided in the Lamb patent disclosure for preventing overrunning of the governor, is there?

A. Yes. Definite means are provided for this purpose, inasmuch as the device is intended to preserve the flow and pressure in the conduit at a fixed point in governor action.

Q. 433. Is it just as efficient a means as the devices provided to that end in Defendant's Exhibits English and Wetmore patents?

A. I would consider it a more efficient means, inasmuch as it controls the pressure and flow conditions in the conduit.

Q. 434. Which would you consider the more efficient means?

A. I would consider the means disclosed in the Lamb patent more efficient than those disclosed in the English and Wetmore patents.

Q. 435. Is there any governor feature disclosed in the Lamb patent which prevents overrunning of the governor, or hunting the governor, other than such inverse working relation as there may be between the valves 9?

A. The Lamb patent does not specify any particulars as to speed-sensitive elements. Its attention is centered on the prevention of pressure and velocity changes in the conduit.

Q. 436. When the governing apparatus was designed for the Power Development Company plant near Bakersfield, these inertia features were likewise considered, were they not?

A. They had been thoroughly appreciated and understood.

Q. 437. Were they contemplated in connection with the design of that Power Development Company apparatus?

A. Do you refer to the governor part, or the part preventing such inertia effects?

Q. 438. The parts aimed to prevent such inertia effects, wherever they may have been located in the general assemblage of the features of the installation.

A. The two principal parts of the device installed at Bakersfield were the load and speed-sensitive parts which had been devised some years before, and the by-pass feature which was found necessary to assist the load and speed-sensitive element in the attainment of satisfactory governing.

Q. 439. Were the features provided in that Power Development Company plant better adapted to take care of the inertia effects in the pipe-line than the governor mechanism disclosed in the Lamb patent?

A. The devices worked along the same general line. Not having seen a plant constructed in accordance with the Lamb patent, I cannot say to what degree of perfection it will operate. The devices installed at Bakersfield performed their functions in a very satisfactory manner to all concerned.

Q. 440. Well, supposing you had placed before you the disclosures, verbal and pictorial, of the Lamb patent, and the disclosures of the Berry Blueprint No. 1, plus the disclosures of yourself as a witness in connection therewith, which governor performance would you select

as preferable to the other to take care of inertia effects in the pipe-line?

A. As far as I am able to compare them in the absence of specific governor parts in the Lamb patent, I would select the device installed at Bakersfield.

Q. 441 Do you remember what the dimensions of the air chamber on the pipe-line just outside of the power house of the Power Development Company were?

A. I do not think I ever knew the dimensions of that device.

Q. 442. As a matter of fact, is not the question of size of the by-pass in the Lyndon disclosure and the number of brake nozzles or drive nozzles or relative number of the same in the Lamb patent, a matter of degree to be determined by the class of service to which each apparatus is to be adapted?

A. In the Lyndon patent the size of the by-pass valve is fixed to take care of such part load as may correspond to that size, and in the Lamb patent the number of reverse acting nozzles is dependent upon the proportion of load it may be desired to take care of in any particular plant.

Q. 443. As a matter of fact, the Lyndon patent provides for taking care of either inertia conditions in the pipe-line accompanying water-gate closing, or inertia conditions in the pipe-line accompanying water-gate opening, does it not?

A. As I understand the mechanism shown in the Lyndon patent, it is to take care of these effects in both directions.

Q. 444. And it is possible for you to contemplate

taking care of these effects in one direction of movement of the water-gates without at the same moment considering the effects which accompany the movement of the water-gate in the other direction?

A. Not with the mechanism shown in the patent.

Q. 445. Cannot you conceive separately of the action of the Lyndon patent mechanism to take care of inertia effects in the pipe-line accompanying water-gate closing without tinting that picture with details of the inertia effects which take place in the pipe-line on water-gate opening?

A. Disregarding the mechanism shown in the Lyndon patent, I could make such a mental picture.

Q. 446. The Lyndon patent teaches, does it not, both sides of this proposition to anyone who is open to such fair reading of the disclosure?

A. The specification clearly indicates the necessity of taking care of these conditions in both directions.

Q. 447. And supposing in a particular plant it was desirable to take care of these conditions acting only in one direction of movement of the water-gate. Do you think that under those circumstances anyone so desiring to take care of the inertia conditions would be deceived by the Lyndon patent into believing that both such must be taken care of in each and every plant, whether those conditions were present in such plant or not?

A. Anyone making such a modification from the declared intention of the Lyndon patent, would have to do it on his own knowledge and not depend on the declarations therein.

Q. 448. I am not now considering modifications of

the structure, but modifications of pipe-line conditions, and if in a given installation there were present pipe-line conditions of inertia which accompanied gate-closing and those pipe-line conditions were in the preponderance. Do you think after reading the Lyndon patent disclosures it would lead one into a belief that there much be present in each and every such installation pipe-line conditions of both kinds and to the same extent, at least, as far as would necessitate dealing with the same?

A. My last answer covered general conditions of operation and not modifications of structure, and I am compelled to answer this question in the same sense, in which I answered that, in that anyone making a distinction between the effect of gate-closing or gate-opening would have to use knowledge outside of the specifications of the Lyndon patent.

Q. 449. Then is it your understanding that in accordance with the invention of the Lyndon patent in suit the water-gate-operating means and the by-pass operating-means must be mechanically connected together for inverse movements accompanying movements of the water-gates in both directions?

A. My understanding is that they must be so connected as to move inversely in both directions, not necessarily mechanically. It shows mechanical means, however.

Q. 450. Is it your understanding that any operative connection in this respect would satisfy the invention of the Lyndon patent in suit?

A. As to general principles; not as to details.

Q. 451. But there must be an operative connection, must there? In other words, there must be a coupling train of operative connections so that there is no disassociation at any time?

A. His device contemplates disassociation of such action after conclusion of governing movement, and the definite action of these two parts during governing movement, so that they shall move inverse one to the other.

Q. 452. But during governing movement there is always a positive association of these features, is there not?

A. His intention was to produce such a positive connection.

Q. 453. And that positive connection results in the actuation of the by-pass operating means during governing action through positively operating impulse-imparting features, does it not?

A. Depending on the ^aefficiency of the parts which he shows for obtaining his result, he has provided for such a definite connection that these two parts will be operated during governing action reversely to each other.

Q. 454. During governing action of the apparatus of Defendant's Exhibit French Patent, if the valve i once leaves its seat and a succession of governing movements takes place in the lever j, piston s, valve t, and lever u and connecting parts, there can be no corresponding and responsive step-by-step action of the relief valve b which then becomes disassociated from the other features. Is that not correct?

A. That is not correct. There is a definite connection between these parts as far as operation is concerned.

Q. 455. Not after the valve i has left its seat?

A. After the valve i has left its seat there is just as definite a connection between the parts as before.

Q. 456. Where is it?

A. It is wherein it permits movement of the relief valve b.

Q. 457. It is a permissive relation and not a compelled relation, is it not?

A. It is permissive in the sense that the energy for movement of the relief-valve b does not come through the parts above the valve i. It is a compelling action inasmuch as the operation of the valve i compels the movement of the relief-valve b.

Q. 458. Well, supposing the first movement of the relief-valve b has been permitted or compelled, and the valve i has left its seat, and further sudden changes in load upon the wheel cause the lever j to operate before the valve i again takes its seat, will such oscillations be accompanied by corresponding movements of the relief-valve?

A. On the supposition that the valve i is open, which supposition involves an upward movement of the cylinder k at sufficient speed to keep ahead of the upward movement of the relief-valve b, a further increase in movement of the cylinder k in the same direction would produce a more rapid response on the part of the relief-valve b. On the other hand, a slowing up of this upward movement on the part of cylinder k or a stoppage of that motion, would stop movement of the parts of the relief-valve b.

Q. 459. Well, suppose the casing or cylinder k res-

ponsive to governing action is elevated so that the valve i separates considerably from its seat at the top of the stem e of the relief-valve b, and remains so elevated for a considerable period of time during continuation of governing action, responsive, we will say, to repeated violent changes in wheel speed, the relief-valve b will be gradually lowered to cut off the port control by taking out c, would it not?

A. The relief-valve b would not be lowered under such conditions at all.

Q. 460. Why not?

A. For the reason that valve i being open, pressure in the chamber above the differential piston b decreases, enabling the pressure below the differential piston to prevail over that above, and move the relief-valve upward.

Q. 461. Then it will further open the relief-valve? Is that correct?

A. On the continued opening of the valve i by a continued upward movement of the cylinder k the relief-valve will continue to open.

Q. 462. And that opening will continue without any interruption in phasing, will it not, during the continued governing action as soon, under which the lever j j may be oscillated oppositely a number of times during the attempted correcting action of the other features of the governor?

A. There would be no such action of the relief-valve b under the oscillating action on the part of the lever j j. Furthermore, any oscillation of such double lever would have to be slow on account of the nature of the con-

necting parts, especially the piston s, and the fluid movement within the cylinder r required to produce such movement on the part of the piston s.

Q. 459. But my question concerns not the movement of the by-pass or the relief valve under the actuation of the other parts of the apparatus, but movement of such relief-valve independently of the movements of the other parts of the apparatus. Now, might not there be to and fro governing actions of the other part of the apparatus during continuous uninterrupted movement in an opening direction of the by-pass b after the valve i left its seat?

A. There can be no such independent action on the part of the relief valve b, nor could there be a continued opening movement of this relief valve under an oscillating condition of the other parts of the governor.

Q. 460. And that is true, is it, if the valve i is off from its seat during oscillations of the other part of the governing apparatus?

A. The valve i in the nature of the apparatus could not be far from its seat at any time.

Q. 461. The action of the relief valve b will necessarily be slow in its movement in either direction, due to the small area of the ports or ducts h?

A. That is altogether a question of proportion of the parts.

Q. 462. Well, consider the proportion shown in the drawing of the French patent.

A. It still remains a question of proportion of parts and a question of the pressure in the conduit. The patent does not definitely show proportions in this device.

Q. 463. Well, it shows some proportions capable of measurement, and I will ask if, in accordance with the proportions shown, the action of the relief valve b may not be much slower than the action of the remaining parts of the governor, such as movement of the piston s in its cylinder, and oscillation of the lever j, the latter occurring upon violent fluctuations of load or wheel speed?

A. I would not expect a slower movement on the part of the relief valve b than on the part of the piston s in the cylinder r, both depending upon the flow of pressure fluid.

Q. 464. Well, the valve i is intended to leave its seat?

A. The valve i is intended to leave its seat to a certain extent.

Q. 465. And to do so the cylinder k must move upwardly faster than the relief valve b, must it not?

A. It must move first, and for continuing opening of the valve i the cylinder k must move upward at the same speed or faster than the relief valve b.

Q. 466. Well, now, while the valve i is away from its seat if a sudden fluctuation in wheel speed occurs, the opposite of that which caused the valve i to leave its seat, will there not be an opening-gate movement accompanied by an opening movement of the relief valve b?

A. I would not expect to find such movement, inasmuch as the movement of the rod t and the cylinder k do not respond directly to violent changes in the speed-

sensitive element, but to movement on the part of piston s.

Q. 467. This response, you take it, would not be as quick as the response effected by the apparatus of the Lyndon patent in suit, or of the apparatus disclosed in Complainant's Exhibits E to L, would it?

A. I would expect in the case of the Lyndon patent the additional response in the connecting mechanism would be very much more rapid than in the case of either the French patent or the Defendant's device shown in the exhibits mentioned.

Q. 468. Then you think that the speed-sensitive element being the dynamo 8, of the Lyndon patent disclosure, is the more efficient and responsive speed-sensitive element than that of the Defendant's structure shown in Complainant's Exhibits E to L?

A. Not at all. The difference in promptness in response is due to the difference in the application of the results of the speed change.

Q. 469. Then the Lyndon apparatus is the most efficiently quick in response to the fluctuations in the wheel speed, or changes in load of these three apparatuses under discussion?

A. Not necessarily.

Q. 470. But still you were inclined to think so, as stated a few minutes ago, were you?

A. I think now as I thought then, that the initial action in the device shown in the Lyndon patent will be much more quick and sudden than the initial action on the part of the relief-valve shown in the French patent

and the relief-valve shown in the Defendant's device described in the exhibits mentioned.

Q. 471. You are not prepared to say, are you, that when the valve i is removed from its seat the oscillation of the lever j of the piston s and of the water-gate connection x cannot take place in Defendant's Exhibit French Patent?

A. Such movements described will produce similar movements on the part of the valve i, tending to close and open it.

Q. 472. Well, my question assumes that the valve i is away from its seat during such oscillation. Would not such oscillation be independent of the movement of the valve b?

A. I cannot conceive of such a combination of actions on the part of this mechanism.

Q. 473. The valve b is not intended to operate until after inertia effect has taken place in the pipe-line, is it?

A. It is intended to operate immediately following the closing movement of the main gates.

Q. 474. And it is not intended to operate synchronously with such closing movements of the main gates, is it?

A. It is intended to operate synchronously with closing movements of the main gates.

Q. 475. I call your attention to that part of Defendant's Exhibit Translation of French Patent which reads as follows, quoting from the first paragraph of the specification thereof, to-wit: "By this arrangement when the water supply to the water-wheel is interrupted by the governor, the by-pass opens and closes slowly,

so that the retained water at the gates of the water-wheel and the resultant increase of pressure are diverted through the open by-pass.”

You will note that this portion of the specification relates to a resultant increase of pressure and to the dissipation of such pressure. Do you not take it that the pressure must first occur in order to be so dissipated or diverted?

A. The quotation given in this question describes the operation of this relief-valve, and states that the by-pass opens on interruption of the water supply to the wheel, and closes slowly. It states further “so that the retained water at the gates of the water-wheel and the resultant increase of pressure are diverted through the open by-pass.” The exact form of this statement is probably the result of a more or less literal translation of the wording in the French patent. It does not necessarily imply that there is resultant pressure, nor does it preclude the possibility of said increase.

Q. 476. Well, I make it out that a diversion of resultant pressure is referred to in this quotation, and in order that there be such diversion, must there not be pressure to divert? Taking the wording of this translation?

A. Taking the word “divert” as we usually understand it, we cannot apply it to something which does not exist.

Q. 477. Then you would conclude, would you not, that the relief-valve b in Defendant’s Exhibit French Patent does not accompany movement of the water-gate-operating means synchronously?

A. The movement of the relief-valve *b* is synchronous with the closing movements of the main gates, according to the construction of the mechanism.

Q. 478. Then does not the mechanism of this French patent fail to produce what the Lyndon invention produces, namely, a prevention of pressure in the pipe-line upon proper synchronous movement of the water-gate and by-pass?

A. The relief-valve shown in the French patent is intended to operate synchronously with the closing movement of the main gates and prevent pressure rises in the pipe-line. The extent to which it will accomplish this result will be dependent upon the perfection of the apparatus. It is not intended to operate on an opening movement of the main gates.

Q. 479. And you think that the intention of this apparatus of the French patent was to prevent increases of pressure in the pipe-line, although the specification states that "the retained water at the gates of the water-wheel and the resultant increase of pressure are diverted through the open by-pass." Is that correct?

A. The evident intention was to prevent this increase in pressure as completely as he could. He would probably be satisfied with a slight departure from perfection.

Q. 480. And you judge his intent more by his drawing, do you, than by the words of the specification?

A. I judge his intent by his drawing and the general intent of the specification.

Q. 481. And you don't think that the wording I have just quoted is as important in establishing his intent as some other parts of the patent disclosure?

A. It is important only so far as its weight, being a translation.

Q. 482. I am not asking you what the importance is, relative to the accuracy of the translation, but what the importance is considering his translation, as a proper embodiment of the meaning of the original French technicalities. Do you not think that the wording of the specification which I have quoted is as proper a standard for the determination of the intent of the patentee of the French patent as any other part of the specification?

A. I would consider the wording of the specification as showing general intent of vital importance in such case.

Q. 483. Now, as a matter of fact, as an engineer, do you not think there is a defect in practicability and positiveness and efficiency in the French patent disclosure, consisting in the provision of a complete physical disassociation between the groups of parts which takes place at the valve i and its seat during governor action?

A. I do not consider such separation a defect in this mechanism.

Q. 484. Do you not think that possibly this disassociation explains the necessity of the specification of this patent admitting in the last quoted excerpt that there is a resultant increase of pressure in the pipe-line upon closing of the gate?

A. Such increase of pressure, while it may be present incidentally, is not necessary to the operation of this device.

Q. 485. You have never seen such a device in operation, have you?

A. I have never seen such a device made in accordance with the disclosure of the French patent.

Q. 486. Now, you have testified, I believe, that the apparatus of the French patent is intended to contemplate the operation of the by-pass more particularly on the opening of the water-gate. If that is a fact, the operation of the relief-valve or by-pass, more particularly, during or accompanying movement of the water-gate or water-gates in one direction, was known prior to the date of application for the Lyndon patent in suit. Is that not correct?

A. Answering the first part of your question, I have not so testified.

Q. 487. Please correct me if I have improperly quoted you on that.

A. I testified that the device shown in the French patent was intended to operate only on a closing movement of the main water-gate.

Q. 488. I stand corrected, and will repeat such question substituting the closing for opening, as to the movements of the water-gate.

A. The correction having been made, I will answer the latter part of the question by stating that it is evident that the patentee of the device shown in the French patent considered the resultant condition in the pipe-line to be of more importance on a closing movement of the main gates than on an opening movement.

Q. 489. And the Lyndon patent in suit, irrespective of those effects which the operation of its mechanism may produce, provides and discloses means for opening the by-pass during governing action upon the closing movement of the gate, does it not?

A. The general intent as shown in the Lyndon patent includes an opening movement on the part of the by-pass coincident with the closing movement of the main gates.

Q. 490. Opening the conduit of the by-pass of the French patent permits the by-pass b to open, does it not?

A. An opening movement of the relief valve b certainly permits it to open.

Q. 491. I don't think you get the question. Read the question. (The Examiner reads the question.)

A. The conduit of the by-pass is shown at c. Therefore, an opening movement on the part of the relief-valve b opens the said conduit c.

Q. 492. And consequent upon the opening of the conduit c the by-pass b executes an opening movement, does it not?

A. Just the reverse is true. An opening movement on the part of the relief-valve b opens conduit c.

Q. 493. Well, I will re-state the question; apparently it is a matter of letters of the drawing. Please point out in the French patent the system of levers which is connected to the body which closes the conduit of the by-pass.

A. The question is indefinite in that it does not state with what it is connected by levers.

Q. 494. Please point out the following construction called for in paragraph 1 under the summary of the translation of the French patent: "The body which closes the conduit of the by-pass is connected by a system of levers to the governor".

A. I would find such a system of levers in u u and w and j j, which form a part of such connection.

Q. 495. What is the body referred to?

A. I would say that the body which closes the conduit of the by-pass is the part b.

Q. 496. Is that body connected with the governor by the system of levers you have pointed out?

A. It is certainly connected in an operative sense, inasmuch as the result produced upon the body b by the governor movement comes through such parts.

Q. 497. Without abuse to the usual engineering parlance, would you consider that any system of levers was connected with any body or object if at times absolute disassociation between such system and the body in the operation of the mechanism under discussion took place?

A. The answer to that question involves the distinction between a physical set of levers rigidly connected and a set of levers so connected as to produce a result.

Q. 498. In speaking of leverage connections, do you not always imply attachment, yielding or rigid, or constraining at all times the part with which the levers are connected to perform in some manner responsive to the movements of the lever?

A. In considering any system of levers, I would consider them in the condition under which I found them for consideration.

Q. 499. When the valve i is off from its seat, are the levers you have mentioned connected in any manner, or so as to produce any result due to such action, with the valve b?

A. They are certainly connected in an operative sense,

the result on b depending upon the opening of the valve i.

Q. 500. If the valve i. never returned to its seat, would you think this connection still existed?

A. If this valve i never returned to its seat I would consider that there would be no mechanism as described.

Q. 501. Would you consider that there was a connection still existing?

A. There would be no operative connection.

Q. 502. And if no operative connection, no operative effect?

A. That would be an abnormal condition, as it is not shown or intended.

Q. 503. I am assuming a position which you may call abnormal, and I ask you whether under that condition there would be any operative connection.

A. I cannot imagine any such permanent condition in the construction shown.

Q. 504. Well, I have imagined a condition, and I will ask you to try to follow my vagaries, if they are such, and I ask if that operative connection would still exist.

A. Considering the vague assumption which contemplates a disruption of the device, there would be no operation such as is intended.

Q. 505. That would not be a vague supposition, would it, if anything should occur to jam the valve b in its casing so as to prevent the return of the valve i to its seat?

A. Jamming of the relief-valve b in its seat would prevent the operation of the device.

Q. 506. You mean the operation of the by-pass device?

A. I am referring to the relief-valve.

Q. 507. Now, supposing you had water supply in the conduit a, having the content which you refer to as being present in the water of the penstock of the Power Development Company plant. Would you not expect that this valve b might become stuck in its casing, the same as that valve of the Power Development Company plant became stuck?

A. In this case, as in the Bakersfield plant, if the parts were too closely fitted, they might stick.

Q. 508. And that being the case, if the valve be stuck when it was down, there might be a prevention under governing conditions of the valve i of returning to its seat. Is that not correct?

A. That is not correct.

Q. 509. Why?

A. Inasmuch as the cylinder k is free to lower and reseal the valve i in any position which the relief-valve b may take.

Q. 510. But my question said during governing action or during governing conditions. That is assuming a repetition of contrariwise movements of the other governing features.

A. That will be a question of the nature of those governing changes.

Q. 511. And these governing changes might take place without any accompanying action of the by-pass if it became stuck in the manner stated? Is that not correct?

A. If the relief-valve b were stuck in its seat, it certainly would not respond to the increase.

Q. 512. Even in the Power Development Company plant there still was a union between the water-gate operating means and the by-pass-operating means so that in motion or at rest there was a definite relation between these parts. Is that not correct?

A. It is link-connected, apparently.

Q. 513. And don't you think as an engineer that such link connections, assuming that they were properly constructed, would be a better and more positive and more reliable and more responsive and more efficient construction and provision than the association of by-pass features and other governing features shown in Defendant's Exhibit French Patent?

A. I would consider the construction used at Bakersfield to operate the by-pass valve better adapted to force the valve into action against all friction resistance and binding, than in the case of the French patent. But as to whether it would be a safer construction than that shown in the French patent is a question as to the relative damage caused by the failure to act or by breakage of parts.

Q. 514. The relief would be more positive, would it not?

A. The relief would be more positive in the case of the Bakersfield plant.

Q. 515. And the same can be said generally, can it not, in comparison with the disclosures of the Defendant's Exhibit Swiss Patent with the construction you have described in the Power Development Company

plant, considering in that direction that there is no positive means shown of opening the water-gate other than the pressure of the water at the gate?

A. In referring to the relief-valve in the previous questions, I presumed you intended to refer to it in this. Is that so?

Q. 516. I am referring now to the inter-relation between the relief-valve and the water-gates in both cases.

A. The connection of parts shown in the Swiss patent as between the main water-gate and the relief-valve is mechanical in its nature and less positive than in the case of the device used in Bakersfield.

Q. 517. When you were up at the Bakersfield plant, which I take it was in 1897, in accordance with the testimony, did you go over the plant or go over the installation outside of the power house and along the pipe-line?

A. I had no connection whatever with anything outside of the power house; but I probably walked over part of it more than once.

Q. 518. How far away from the power house, as you recollect it, was the point of junction of the flume and the pipe-line?

A. A short distance, up the side of the mountain. Just how far I have no recollection; probably several hundred feet.

Q. 519. How many feet, as near as you can estimate?

A. Making nothing more than a guess, I would say perhaps a thousand feet.

Q. 520. What sort of a screen is provided at the junction of the flume and the pipe-line?

A. I have no recollection of a screen placed there. I presume it was the ordinary grizzly.

Q. 521. What is the interstice dimension of the ordinary grizzly?

A. I cannot speak positively, but I would judge 1 inch, or thereabouts.

Q. 522. Is that the usual dimension provided in pipe-lines adjacent to power houses?

A. I should say so, more or less.

Q. 523. And that dimension is provided in order to keep foreign objects and substances tending to interfere with the plant and the gates and other features, and clog the same, from entering the penstock?

A. It is intended especially to prevent floating foreign objects from entering the pipe-line.

Q. 524. Did you make any particular analysis of the content of the water passing the pipe-line of the Power Development Company plant, or was there any such analysis made to your knowledge?

A. I made no such analysis, and I cannot say that any was made. There was a definite report as to the freedom of the water from any foreign matter—a very definite report.

Q. 525. As you understand it, the Lyndon patent provides specifically or discloses specifically in the one embodiment of the invention reflected in the specifications and drawings, a by-pass normally about half-way open, so that both inertia effects may be taken care of, that is, those inertia effects which accompany wheel-gate closing and those which accompany wheel-gate opening?

A. The clear intention of the Lyndon patent is to provide for inertia effects both on opening and closing of the main gates, which involve a condition that the by-pass valve shall be half-open in its normal position.

Q. 526. The Lyndon patent disclosure also provides, does it not, means for operating the water-gate in either direction?

A. The Lyndon patent discloses means for operating the main water-gates in both directions.

Q. 527. Does it not disclose means for operating the main water-gate in either direction?

A. The meaning is the same in this case.

Q. 528. If you state that a stream flows either north or south, do you mean to imply that it flows in both directions?

A. In that case I would imply that I did not know what the direction was.

Q. 529. Well, the tidewaters flow through the Golden Gate either into the Bay or out of the Bay, as I understand it. Now, at no time do they flow in both directions, do they?

A. As to the first part of the question I would say that the statement as to the flow of the tide is incorrect, inasmuch as the flow of the tide is into the Bay and out of the Bay. At no time can this flow be in both directions at once.

Q. 530. Can you state at what period of governing operations of the Lyndon patent apparatus the gate moves in both directions?

A. The gates cannot move in both directions at the same instant, but if they did not move in both directions

there would be no control of water coming therethrough.

Q. 531. But there is a clear distinction, is there not, between the inertia effects which accompany the movement of the gate in a closing direction and the inertia effects which accompany the movement of the gate in an opening direction?

A. Mr. Lyndon makes no such distinction.

Q. 532. I call your attention to that portion of the specifications of the Lyndon patent in suit commencing in line 16 of page 1 thereof, as follows: "i.e., the opening of the gate operating to momentarily cause less velocity of water at the wheel, owing to the greater orifice the water has to flow through, and vice versa, the closing of the gate operating to momentarily cause an increase of velocity, owing to the construction of the orifice. Moreover, these contrary effects will last until the changed conditions can be imparted to the source of supply of water. One object of my present invention is the overcoming of these opposite effects." And this statement is preceded by the following statement, commencing in line 13, page 1: "Now the first effect of such opening or closing of the gate, owing to the inertia of the water, is always the opposite to that which it is desired to bring about—" Do you not think that these excerpts indicate a distinction in the mind of Lyndon as between these inertia effects?

A. I regard the statements just quoted as indefinite, incomplete, and, if the statement is in conformity with Mr. Lyndon's exact understanding of conditions therein, he did not understand those conditions.

Q. 533. You have testified that before Mr. Lyndon

filed his application, namely, September 13, 1900, it was a known thing, as witness the French patent, to provide more particularly for one of these inertia effects, namely, that accompanying the closing of the gate. Assuming that Mr. Lyndon was aware of such knowledge, does not his distinction become appreciable?

A. Assuming that Mr. Lyndon knew of the varying seriousness of these inertia effects, he failed to make it clear in the excerpts just given.

Q. 534. You knew of the seriousness of these varying inertia effects in the year 1896, didn't you?

A. I knew that the effects following the closing of a gate were more dangerous in their effects on the pipeline, inasmuch as the effects in the opposite direction tended to greater safety for the instant, inasmuch as the pressure was reduced.

Q. 535. Is there anything indefinite in the following language of the Lyndon specifications as indicating an appreciation by Lyndon at the time he filed his application of the distinction between these inertia effects, commencing at line 52, page 4 of the specifications: "As is well known, if a water-wheel gate is suddenly opened to increase the speed of the wheel, the first effect will be to actually decrease the speed of the wheel, for the reason that the velocity of the water through the gate drops, because a larger area for the water to pass through is provided, and a larger volume of water is not immediately provided, because there is a time element required, which time element is the length of time required for gravity to accelerate the entire volume of water contained in the feed pipe, which cannot be accomplished

instantaneously. If the water-wheel gate be closed, a reverse effect will be noticed—that is, instead of decreasing the speed of the wheel, the speed will actually rise, owing to increased velocity, through the water-wheel gate, due to a decreased area of opening, while the volume of water remains for the time constant, the volume decreasing only after a short time has elapsed, which length of time is required to arrest the column of water in the feed pipe. It is obvious that the by-pass, arranged as described, opening or closing in a manner opposite to that in which the main gate opens or closes will, if properly adjusted, admit of the main gate being rapidly operated and the governing of the water-wheel quickly accomplished.”

A. I regard the statement as quoted as incorrect in several particulars, and as containing nothing whatever to indicate that Mr. Lyndon intended to differentiate between the effects following opening and closing of the main water-gate.

Q. 536. You do not mean to say, do you, that he does not apparently differentiate between the inertia effects which take place upon the closing of the gate and those which take place upon the opening of the gate?

A. He indicates that he knew that these effects would take place, both on opening and on closing of the main gate.

Q. 537. Not that both took place on their closing or opening? Is that how I understand you?

A. My answer is correct.

Q. 538. Well, you do not think that his language leaves any doubt as to the conclusion that he associated

certain inertia effects with the opening of the gate, and other inertia effects with the closing of the gate? Is that not clear from what he states?

A. The quotation indicates that Mr. Lyndon knew that there would be no pressure rise on closing the gate. The quotation just made indicates that Mr. Lyndon appreciated the fact that there would be, in his opinion, a reverse effect to that desired upon the opening and closing of the main gate.

Q. 539. And he indicated, did he not, that he well knew that certain adverse and objectionable inertia conditions would obtain upon the movement of the gate in a closing direction, and certain unfavorable and adverse inertia effects would obtain upon the movement of the gate in a closing direction?

A. He differentiates between the effects which would follow closing and opening of the gate, but does not state the degree to which these things would affect the conditions.

Q. 540. He states, however, does he not, that certain specific effects accompany opening movement of the gate and certain other specific effects accompany closing movement of the gate?

A. He states that the effect following closing of the gate would be the reverse of that following the opening of the gate.

Q. 541. And he does not leave any doubt in the mind of the reader of his specifications, does he, that he intends to correct the unfavorable adverse inertia conditions accompanying the closing of the water-gate by opening the by-pass, and, vice versa?

A. His declared intention is to take care of these inertia effects both on opening and closing the main gate by closing and opening the by-pass valve.

Q. 542. And it is clear that he intends that the by-pass shall be open to correct the adverse conditions which accompany closing movement of the gate, and also that he intends that the by-pass be closed to correct the adverse inertia effects which accompany opening movement of the gate? Is that not correct?

A. He clearly indicates his intention of reversely operating the by-pass valve on movement of the main water-gate both in opening and closing direction.

Q. 543. That is not an answer to the question. I will ask that it be re-read, as I do not wish to encumber the record or bother you by unnecessary questions, and I think my last question is clear. (The question is read by the Examiner.)

A. That is his position, as I understand it.

Q. 544. And there cannot be any conclusion drawn from reading his specification, can there, that the by-pass valve shall be both open and closed upon movement of the water-gate in opening direction, and both open and closed upon movement of the water-gate in a closing direction?

A. I cannot draw such a conclusion from his specification.

Q. 545. Then does he not instruct us that either the water-gate is moved in a closing direction accompanied by a movement of the by-pass valve in an opening direction, or that the water-gate is moved in an opening direction accompanied by a movement of the by-pass valve in a closing direction.

A. The clear intent of his specification is that this reverse action between the main water-gate and the by-pass valve shall occur both on an opening and closing movement of the main gate.

Q. 546. I shall have to ask that the question be read and that it be answered yes or no, unless the witness states that he cannot understand it or, for some reason refuses.

(The question is re-read.)

Mr. Westall: Counsel for the defendant suggests that the question is indefinite. It is a question in which play is made on words more than on ideas. The witness has positively and distinctly testified many times that the parts mentioned operate in both directions.

Mr. Blakeslee: The question speaks for itself, with the previous testimony.

A. The question is indefinite in that it hinges on an interpretation of the word "either," which has two meanings, and in order to understand its meaning in any particular case, reference must be had to the context. The word "either" occurs in these specifications in eighteen places, sixteen of which are connected to movements of the main water-wheel gates, or water-gate-operating shaft, and to one or two other elements of this patent, in such a manner that it is impossible to interpret the meaning of this word in any other sense than that it shall mean "both". In two cases it is applied to movements of the by-pass valve. This occurs in Claim 7 on page 5, line 75; starting at line 73: "and adapted to operate the by-pass valve from normal position in either direction, so as to control such valve inversely to the control of the water-

gate". In this case the use of the word "either" is so qualified by reference to the movement of the main water-gate that there can be no misinterpretation as to its meaning. It means "both". Again, in Claim 9, page 5, and starting at line 104: "and a valve for such by-pass, normally held in partly open position, of means adapted to operate said valve in either direction." In this case the use of the word "either" is so qualified by reference to the position of the valve being normally held in partly open position, that there can be no doubt as to the word "either". It means "both". In view of this I consider my previous answer perfectly correct.

Q. 547. The Lyndon patent disclosure provides means for giving a closing movement of the by-pass in accompaniment with an opening movement of the water-wheel-gate; does it not?

A. It so provides.

Q. 548. The Lyndon patent disclosure provides means for causing an opening movement of the by-pass in accompaniment with a closing movement of the water-gate, does it not?

A. It so provides.

Q. 549. Both of these operations cannot take place at the same time, can they?

A. Both applying to the different states of operation, they cannot take place at the same instant.

Q. 550. By "both" in my last question, I mean the operation stated in both the preceding questions. It cannot take place—that is, the two groups of operations—cannot take place simultaneously?

A. The two groups cannot take place simultaneously.

May 7, 1914. A. M.

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resumed by Mr. Blahodet

Q. 551. If you substitute the word "both" for the word "either" in either Claim 6 or Claim 7 of the Lyndon patent in suit, the resultant verbiage will be ungrammatical, will it not?

A. In Claim 6 of the Lyndon patent in suit the word "both" could be used without destroying the sense by changing the word "direction" to "directions". In Claim 7 the same change could be made without departing from the spirit of the claim and without destroying the grammatical construction.

Q. 552. But in order to avoid destroying the grammatical construction it would be necessary, would it not, to pluralize the word "direction" in each instance?

A. It would be necessary to do so.

Q. 553. So, if you so pluralize the word "direction" in these claims, the claims will then call for at least two directions, will they not?

A. They will call for both of the only two possible directions.

Q. 554. And if the word "direction" were retained, it could hardly appropriately be said that the word "direction" must unequivocally mean "directions", or more than one direction? Is that not correct?

A. The word "direction" taken alone means one direction. When qualified, it may mean one or both.

Q. 555. But it can never be qualified by the conjoint use of the word "both" without using the plural form of the word "direction"?

A. I would not apply the word "both" to "direction" without using the plural form.

Q. 556. A witness for the defendant in this case has testified that at the Power Development Company plant,

about which you have testified, means for adjustment were provided whereby the by-pass valve could be given a pre-determined set or normal position. This is reflected in Defendant's Exhibit Cobb Blueprint No. 1. Do you remember any particulars about this adjustment?

A. This is one of the details which had escaped my memory, and I regard it now as a means for properly adjusting the various parts of the mechanism, a result which could equally well have been obtained by adjusting the length of the rod 40.

Q. 557. That adjustment did permit you to set the by-pass valve in relation to the water-gates, did it?

A. As I remember it, the intention was to make the proper adjustment between these parts.

Q. 558. How about the set of the by-pass valve? That is to say, its set so as to order the relation of the flow permitted thereby to the flow of the water-gates?

A. The sole object of the mechanism installed in the plant at Bakersfield was to pass through the by-pass valve that quantity of water rejected by the wheel, as in all hydraulic nozzles it is difficult to predict the exact coefficient of discharge, and to obtain agreement as between quantities discharged by diverting nozzles, adjustment is required by which this question can be settled in practice by experiment.

Q. 559. That means of adjustment at the Power Development Company's plant permitted the by-pass valve to be adjusted in either direction, did it?

A. According to the part shown on Defendant's Exhibit Cobb Blueprint No. 1 in the upper right hand corner, this adjustment could be made in both directions, if the starting point is taken from the center. Just

how it was arranged as to the particular detail, I do not remember.

Q. 560. I suppose you avoid the use of the words "either direction" for some reason or other, and I will ask you if it was possible that the valve could be adjusted in either direction?

A. The valve could be adjusted in either direction from the central position shown. Yes.

Q. 561. Now, such adjustment of the valves so that the normal condition of the flow or normal service of the valves could be varied, was a well known work-shop operation, wasn't it, at that time?

A. It was well known at that time that it was difficult to predict exactly the discharge results obtainable from varying types of nozzles. It was recognized that this adjustment was a matter for facilitating in installing and starting machinery,

Q. 562. And that adjustment would permit of using the working relation between the water-gates and by-pass I suppose?

A. That was the object of that adjustment,

Q. 563. Had you ever tried out such an adjustable by-pass device before?

A. I don't remember whether there was an adjustment provided in the original by-pass or not. The plant was a comparatively small one and we heard nothing from it after installation, both of which things tend to facilitate forgetfulness of details.

Q. 564. Was this a feature which you advised yourself, Mr. Berry?

A. It was.

Q. 565. And prior to advising it and advising the

other features of the general combination of elements which you have testified entered into the installation of the Power Development Company's plant, had you ever seen such organization before?

A. If you refer to the adjustable means to facilitate the exact adjustment of relationship between the various parts of machines, it was quite common.

Q. 566. I am speaking now of the general organization of the installation, including all of the general elements which you have testified about. Was that, as far as you know at the time, a novel organization? That is, new with you?

Mr. Westall: Objected to as being so general in nature as to what counsel means by "general elements testified to." There are a great many elements going to make up the installation referred to.

A. Answering the question as nearly as I can on account of the indefinite nature, I will say that the governor had been previously used. The hydraulic cylinder as a power means has been used. The by-pass valve had been used previously. There had been no plant designed in strict accordance with this one.

Q. 567. By Mr. Blakeslee: As far as you know, was it novel with you at that time, or was it, we will say, an original production of yours at that time or prior to that time, namely, the combination of the water-gate or gates and by-pass with a governor or appropriate speed or load-sensitive device, or both speed and load-sensitive device, and means whereby the by-pass operated inversely to the water-gate-operating means, under control of the governor?

A. As I have previously testified, the plant installed

on the American River previous to the design of this one contained in a general way this governor and by-pass valve arranged in such manner that the by-pass valve opened when the main water-gate closed, and reversely.

Q. 568. And did you likewise design that American River plant?

A. I did.

Q. 569. Then was the combination that I have stated in the next to the preceding question novel with you, and was it your inventive production, as far as you knew at that time?

A. I had nothing to do with the original design of the governor. The by-pass valve was as far as my knowledge is concerned original with me in connection with the plant on the American River. Whether it had been in use elsewhere, I am unable to say.

Q. 570. As far as you knew, prior to the installation of the alleged American River plant, had the combination in a water-wheel governor of a water-gate or gates and a by-pass operating inversely thereto under control of a speed-sensitive or load-sensitive, or both speed and load-sensitive governing elements ever been produced?

A. The use of the by-pass valve so arranged was new to me at the time the plant on the American River was installed. It was devised by me to correct disturbances produced in the main conduct by the extremely rapid action of this governor.

Q. 571. As far as you knew at the time mentioned, was the combination which I have stated new with you?

A. The combination was new to me at that time.

Q. 572. You know, do you not, that that combination

as installed at the Power Development Company plant in Bakersfield or near Bakersfield was wholly inoperative and that it never did successfully work, and that the Girard wheel installation including the by-pass was taken out, discarded and sold as junk, within two months after it was received and set up at the point of installation?

A. In answer to part of the question, I know nothing of the kind. In fact the plant operated with extreme satisfaction as to governing, as to the by-pass action. The sole reason why this machinery was discarded was on account of the low efficiency of the Girard wheel.

Q. 573. About when they changed the wheels?

Mr. Westall: You may note an objection there to "throwing the device on the scrap heap", that it is very indefinite and general as to what is meant by "the device". If counsel will specify more particularly what parts he is talking about, it will be easier for the witness to testify.

Q. 574. By Mr. Blakeslee: Do you know whether or not they are using a by-pass and by-pass valve in any plant which may be operated at the point of the Power Development Company's installation at the present time?

A. I cannot say as to that point, but I know this, that the wheels immediately following the Girard wheels in this plant were so constructed and arranged that a by-pass valve of the nature originally installed would not be required. That is, the wheels were impulse wheels, using deflecting hoods which, inasmuch as they perform the same functions as the by-pass valve originally installed, would render the double use out of the question.

Q. 575. You know, do you not, that after these Tut-

hill wheels were experimented with at the plant mentioned, they were taken out and Knight wheels put in?

A. That is my impression.

Q. 576. Do you not know that Edward S. Cobb, who has testified for the defendant in this case, attempted to resuscitate the by-pass experiments at this plant in connection with the Knight wheels and to use the governor which you installed in connection with the Girard wheel, in connection with this said by-pass, and that he utterly failed, and the second attempt to operate the by-pass at this plant resulted in pure failure and was discarded?

A. The question is very general and indefinite in that it mentions a second attempt to operate the by-pass valve unsuccessfully, whereas, as a matter of fact, the first attempt was entirely successful. As to the other part of the question, I have no information as to what occurred in that plant after the tests of the Girard wheels.

Q.577. Do you not know that the by-pass opening of the tailrace at that plant was sealed up after attempts to operate the by-pass, and after that by-pass had been removed and discarded?

A. I have no knowledge on this point, and I am certain that the discharge from this by-pass was not sealed during my visit at the plant.

Q. 578. In putting in the Tuthill wheels at this plant in substitution for the discarded Knight wheels, and by-pass, I suppose that the conclusion had been reached that they must use a type of wheel which did not depend upon a by-pass for successful control. What do you say as to that?

A. The question is inaccurate in that it states that

Tuthill wheels were put in in place of discarded Knight wheels.

Q. 579. That is my mistake. Instead of discarded Girard wheels, I mean.

A. I have no means of knowing what considerations were reviewed, when the Tuthill wheels were designed, but I believe from the nature of those wheels that the deflecting hood used was a very much simpler way of controlling those wheels, inasmuch as they do not require the application of a contracting nozzle. The nozzles were simply cylindrical tips and the whole control of the water issuing from these was by means of these deflecting hoods.

Q. 580. Can you state what the efficiency of the Girard wheels at the Power Development Company's plant was?

A. I do not remember now the exact figures, but I believe it was between 65 and 70 per cent.

Q. 581. Was that a pretty good efficiency?

A. It was too low to satisfy the conditions at that plant.

Q. 582. You know that a report was prepared, do you, by Edward S. Cobb, on the efficiency of these Girard wheels and the general installation?

Mr. Westall: Objected to as assuming something that has not been shown by the record, namely, that there has been a report on the efficiency of the general installation. The report, the testimony clearly shows, was as to the efficiency of the wheels and did not have anything to do with the by-pass and the governor arrangements.

Mr. Blakeslee: In response to counsel's attempt to color the testimony in this case, we will read from that re-

port and from page 18 thereof, being a quotation from Defendant's Exhibit Cobb Efficiency Report, to-wit: "The by-pass valves are not reliable and have so far given a great amount of trouble and should be replaced by a construction that will render it possible to operate them with certainty by the hydraulic cylinder provided in part for that purpose." What, if anything, do you know about that report?

A. I do not remember that I saw any report made by Mr. Cobb on any part of this plant.

Mr. Westall: In answer to the quotation of counsel and his assumption that he has found something reporting as to efficiency because by the use of the word "by-pass valve" it is pointed out that those facts, as far as the record abundantly shows, were simply directed to the peculiar construction of the by-pass valve in that, as Mr. Cobb has testified, it was so perfect mechanically there had not been room enough or play enough left to take care of the grit in the water, and that that matter was corrected speedily, as Mr. Cobb has testified, simply by lossening the valve, and that therefore the attempt to color the testimony comes entirely from the complainant's counsel in this case.

Mr. Blakeslee: The court will readily see the inaccuracy of counsel's statement that that report had nothing to do with the by-pass, and further, will see counsel's manifest attempt to coach and assist the present witness by putting a construction upon the testimony of the witness Cobb and paraphrasing the record in the presence and hearing of the witness. This is not the proper procedure, and we strenuously object to it.

Mr. Westall: The witness has already testified as to

the necessity of slight changes in the construction of the by-pass valve, and any suggestion that may have been given to him now is only for the purpose of correcting the false color that the complainant's counsel has placed upon the record.

Mr. Blakeslee: The record speaks for itself, and the quotation speaks for itself, and counsel is admitting that he is suggesting to the witness, and we repeat our objection to such procedure.

Q. 583. What would you have considered a good efficiency at that plant—that is, of the Girard wheel?

A. I would consider an efficiency of 80 per cent to be satisfactory.

Q. 584. At what load would this efficiency have been a good efficiency?

A. This efficiency would have been good at any load which could have been obtained.

Q. 585. Do you mean that had you obtained an efficiency of 80 per cent with these Girard wheels, at any load, you would have been satisfied with the efficiency?

A. Not at all.

Q. 586. Then in what respects would 80 per cent have been a satisfactory efficiency?

A. An efficiency of 80 per cent would have been satisfactory as to that particular load as to which it could have been obtained.

Q. 587. Well, if the maximum load of these wheels was approximately 700 to 750 horse power, at what load would you have considered 80 per cent efficiency of the wheels to have been a satisfactory efficiency?

A. As I have answered before, I would have consid-

ered that efficiency satisfactory at any particular load that was obtained.

Q. 588. If those wheels had shown an efficiency of 80 per cent at a load of 700 horsepower, would you have considered that a good and satisfactory efficiency?

A. I would.

Q. 589. That is to say, as I understand you, that if at any time these wheels operated with a load of say 700 horsepower and at that load developed an efficiency of 80 per cent, that would be a good and satisfactory efficiency for the Girard wheel at that load? Is that the conclusion I am to put upon your answer?

A. As far as I understand the question, I have answered it before to the extent that an efficiency of 80 per cent at this load would be satisfactory efficiency.

Q. 590. A satisfactory efficiency of those Girard wheels which were then in that plant?

A. I am speaking of the Girard wheels.

Mr. Westall: This line of questioning is objected to for the reason that it is entirely incompetent, irrelevant and immaterial, and not proper cross-examination. The efficiency of wheels has nothing to do with this case. Lyndon shows no water-wheel of any kind, and whether a wheel used in connection with the plant at Bakersfield was efficient or not, can make no possible difference in any decision in this case or any possible theory.

Mr. Blakeslee: The Court will perceive that this is purely that sort of an argument on the record which the equity rules prohibit, and this is certainly cross-examination, as it deals with the operation of the plant installed on the design of the present witness, according to his present testimony, and upon argument at the proper time

the proofs adduced in such cross-examination will be shown to be most material to the purported defenses in this suit.

Mr. Westall: Counsel simply suggests that the question is directed entirely to an effort to exclude from the record matters which can have no possible good effect. The record is already very voluminous and it is the duty of counsel to keep it in bounds by proper objections.

Q. 591. By Mr. Blakeslee: Now, there is nothing disclosed in the Lyndon patent in suit which would prevent the adjustment of the by-pass valve 48 or the determination of the proper or preferred set or normal position thereof, is there?

A. There is nothing except the specification declaration of "half-open position" as being his normal position.

Q. 592. Well, it is clearly possible, is it not, for the ropes 51 52 to be shifted in connection with the idlers 53 and the clutch members 57 58?

A. There is nothing to prevent such shifting between limits, except his specific declaration.

Q. 593. He makes no specific declaration that such shifting is not possible?

A. He does not mention such shifting in any way.

Q. 594. You would not consider it a troublesome engineering problem, would you, to vary the desired or normal or preferred position of the by-pass valve 48 by so shifting the ropes 51 52-

A. I can conceive that it would be easy to make such shifts within certain limits.

Q. 595. Such adjustment of the by-pass valve is

clearly provided for in the Lyndon patent, is it not?

A. It is not mentioned in any way.

Q. 596. I call your attention to the following excerpt from the specifications of the patent in suit, on page 4 thereof, commencing at line 74: "It is obvious that the by-pass arranged as described, opening or closing in a manner opposite to that in which the main gate opens or closes, will, if properly adjusted, admit of the main gate being rapidly operated and the governing of the water-wheel quickly accomplished." Can you conceive of any adjustment of the by-pass 48 other than an adjustment of the same with respect to its preferred or desired or normal position to determine the flow of water through the by-pass?

Mr. Westall: Objected to. There is nothing in the quotation referred to that deals in any way with such adjustment as counsel has referred to in the question.

Mr. Blakeslee: We are not examining counsel, and we do not care to have him answer the question for the witness, or any other question. This procedure would not be for a moment permitted in open court, and we will ask the Court to keep in mind the irregularity of such procedure in connection with this testimony.

A. I would consider the intent of the words quoted as meaning "properly adjusted," in order to obtain the plainly stated conditions which he aims at in his specification.

Q. 597. Well, can you conceive of any other adjustment than an adjustment of the by-pass valve upon its stem 49 for its axis?

A. The most obvious adjustment of this by-pass valve 48 is to place it in the position clearly specified as

that which would attain his clearly expressed object. It is in nature the same adjustment as is provided in the Bakersfield device to properly correlate the by-pass valve with the main water-gates.

Q. 598. But the very provision for such adjustment in either such direction involves the idea of changing the position of the valve, does it not?

A. Not necessarily.

Q. 599. There can be no adjustment unless there is a change of position, can there?

A. There can be proper adjustment to place this thing in operating condition.

Q. 600. Does not "adjustment" mean shifting from one position to another? If a thing is said to be definitely fixed and not subject to adjustment, we have the antithesis of adjustment, have we not?

A. The provision for adjustment implies a possible necessity for such, but it applies particularly to placing the mechanism in operating condition when starting up, and this is especially applicable in case of ropes—to change their length. The device shows no means whatever for any great deviation from the conditions specified in the patent.

Q. 601. Then in adjusting the by-pass valve prior to starting up, it is to be assumed that one would so adjust it that the by-pass would resultantly operate in accordance with the demands made upon it by the service to be met by the installation. Is that not correct?

A. That would depend upon whether the man were following the disclosure of the Lyndon patent or was working on his own knowledge.

Q. 602. Let us assume that he followed the disclos-

ure of the Lyndon patent. If he followed it and at the same time adjusted the by-pass in accordance with the quotation from the specification last put on the record, he would be most likely, if he had any engineering sense and judgment, to so adjust the by-pass valve as to meet the conditions of service which the installation had to deal with?

A. If he were following the disclosures of the Lyndon patent there could be but one place for him to locate this by-pass valve.

Q. 603. That is to say, one place which would, for the purposes of that installation, and under those conditions of service, be the preferable place, I take it?

A. Not at all. It would be that place plainly declared in the Lyndon specifications as the preferable place.

Q. 604. And if he found that some other place were preferable under some other circumstance, do you think he would be foolish enough to keep the by-pass in a less favorable place, assuming that he was a man of, say, your own engineering ability?

A. In that case he would be departing from the disclosure of the Lyndon patent, and would be working on his own knowledge. As to the efficiency of such choice, it would depend on the accuracy of his knowledge in relation to the conditions of the plant.

Q. 605. That is to say, if he used apparatus constructed in accordance with the Lyndon patent in suit, and in utilizing the invention used some of his own plain, common, engineering knowledge, he could not be said in using such apparatus to be utilizing the dominant principle and law of operation and function of such apparatus?

A. The question is extremely indefinite. I fail to obtain a clear conception from it, and I will ask that it be re-stated.

Q. 606. I will give the witness a chance to hear the question over, and to answer it if he wishes, before putting another. I have no desire to enter into obscurity or anything of that sort, but I should like an answer if the witness can give it.

(The Examiner reads the question.)

Mr. Westall: Counsel for the defendant will admit that if he used apparatus constructed in accordance with the Lyndon patent in suit, and in utilizing the invention used some of his plain, common, engineering knowledge, that is to say, by "utilizing the invention" utilizing the disclosures of the Lyndon patent in suit, in the use of his ordinary skill and engineering knowledge, he would not be departing from the disclosure of the Lyndon invention. But if he had to entirely re-organize the apparatus and re-invent the devices therein imperfectly shown, or depart from the principles enunciated in the Lyndon patent as suggested by counsel, that he would be departing from the dominant principle and law of operation and function of such apparatus. It would depend entirely upon what changes are made in any apparatus by the engineer.

Mr. Blakeslee: Having listened to these platitudes, for which we render thanks, so far as they may be of advantage, with the observation that the witness has been educated along with the rest of us, we will ask him if he will not answer the question.

Mr. Westall: The admission is simply made for the purpose of saving time along this line of inquiry.

A. I am still unable to obtain a clear idea from the question. It is so worded that I do not understand the question in it.

Q. 607. By Mr. Blakeslee: Passing this question, then, as you do not care to answer it, I will ask you whether you consider that any engineer in utilizing the invention disclosed in the Lyndon patent and taking advantage of the provision made therein for adjusting the by-pass, ~~as clearly suggested by the quotation from the specification above made, would be, in so adjusting the~~ by-pass, as clearly suggested by the quotation from the specification above made, would be, in so adjusting the by-pass and in using common mechanical skill to adjust it, departing from the use of the Lyndon patent invention?

A. I would consider that in making any adjustment of this by-pass valve other than plainly shown in the specifications, he would necessarily depend upon knowledge of his own, entirely beyond that disclosed, and in a certain sense contrary to the disclosure of said patent, inasmuch as the disclosures plainly indicate an appreciation of these effects, both on opening and closing of the main water-wheel gates, and there being absolutely no differentiation of such effects.

Q. 608. Then you think it was merely an idle thing that Mr. Lyndon clearly referred to the adjustability of the by-pass in his specifications?

A. I think he referred to that to obtain the objects clearly brought out in his specification, and this is especially clear in view of the nature of the connecting parts concerned, inasmuch as these are ropes which ord-